

L-Proxy™



User's Manual

LOYTEC electronics GmbH, Vienna

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Contact

LOYTEC electronics GmbH
Blumengasse 35
A-1170 Vienna
AUSTRIA/EUROPE
support@loytec.com
<http://www.loytec.com>

Version 3.0

Document No. 88065705

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1 Introduction

1.1 Overview

The L-Proxy is a high performance network infrastructure component for EIA-709 networks. It is the first device that allows network variable bindings across multiple domains, SNVT translation, address table expansion for EIA-709 nodes, firewall security etc. The L-Proxy provides **five** communication ports and it translates packets between these ports. Available ports are two FT ports, and three IP-852 ports. The three IP-852 ports are connecting to an IP-852 backbone channel. The L-Proxy's unique architecture very much supports well defined interfaces between various subsystems like HVAC, lighting, and security in a typical building.

The basic operation of L-Proxy is to take an input network variable on one side, interpret the data in the variable and transmit a corresponding output network variable on the other side. This concept is used to solve a great amount of today's communication problems in EIA-709 networks as explained in the following chapters.

L-Proxy is configured over the network with an easy-to-use configuration tool. This configuration tool can be used as a plug-in for LNS-based network installation tools or as a standalone tool.

The L-Proxy is used for:

- ◆ Binding of network variables across multiple domains (up to 5 with a single device)
- ◆ Using static, dynamic, or external (polled) network variables
- ◆ Overcome the 15 destination addresses limit by expanding the address table in Neuron Chip based network nodes (up to 512 address table entries on each port)
- ◆ Save group addresses by breaking up groups into individual NV updates
- ◆ Translation between different SNVT types
- ◆ Firewall for EIA-709 networks
- ◆ Supports up to 512 network variables on each port
- ◆ Supports up to 512 alias-network variables on each port
- ◆ Supports up to 512 address table entries on each port

1.2 Scope

This document covers L-Proxy devices with firmware version 3.0 and up. See Section 15 for differences between the different L-Proxy firmware versions. For L-Proxy devices with

firmware versions before 3.0 please refer to L-Proxy User Manual version 2.2 [2]. Also note, that firmware and configuration files of L-Proxy 3.0 are not compatible with 2.2.

2 What is a Proxy?

Webster's Revised Unabridged Dictionary (1913) lists the following entries for *Proxy*:

Proxy \Prox"y\, n.; pl. Proxies. [Contr. from procuracy. Cf. Proctor.]

1. The agency for another who acts through the agent; authority to act for another, esp. to vote in a legislative or corporate capacity.
2. The person who is substituted or deputed to act or vote for another.
3. A writing by which one person authorizes another to vote in his stead, as in a corporation meeting.

L-Proxy follows this definition. It acts on behalf of somebody else. For L-Proxy the “somebody else” is another node in the network. As shown in Figure 1 the L-Proxy hardware offers 3 physical network ports, two FT and one IP-852, which represent 5 individual nodes, one on each FT port and three on the IP-852 port. One can think of L-Proxy as being 5 individual nodes that are somehow internally connected. Whenever an input network variable on L-Proxy is being updated, L-Proxy updates a corresponding output network variable. Also if a network variable poll is received on the output network variable this poll can be forwarded to the input network variable. It doesn't matter if the output network is on the same node or on one of the other four nodes as the input network variable. Since the 5 nodes can be configured in different domains, it is now possible to bind network variables across domains.



Figure 1: L-Proxy offers five network ports, which represent 5 individual nodes.

We have listed use cases for L-Proxy that are typical in network installations. We use these use cases to explain the fundamental operation of L-Proxy. Remember that input and output network variables can reside on the same node or different nodes, in the same domain or in different domains. The behavior of L-Proxy is always the same.

2.1 Update-Update Use Case

Figure 2 shows an Update-Update use case. In this use case the input network variable of the L-Proxy is bound to an output network variable of Node 1. This output network variable is periodically updated. On the output side of L-Proxy the corresponding output network variable is also bound to an input network variable on Node 2, which is waiting for updates.

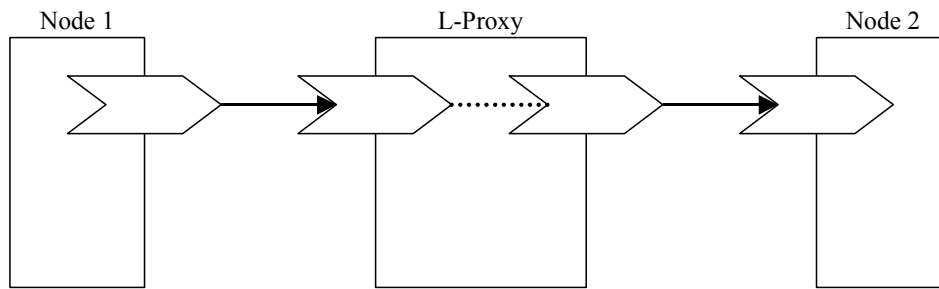


Figure 2: Update-Update use case

2.2 Poll-Poll Use Case

Figure 3 shows a Poll-Poll use case. In this use case the input network variable of L-Proxy is bound to an output network variable of Node 1. However, this output network variable on Node 1 is declared polled and never updated. Hence, Node 1 waits for incoming polls. On the output side of L-Proxy the corresponding output network variable is not bound. Node 2 periodically polls this network variable.

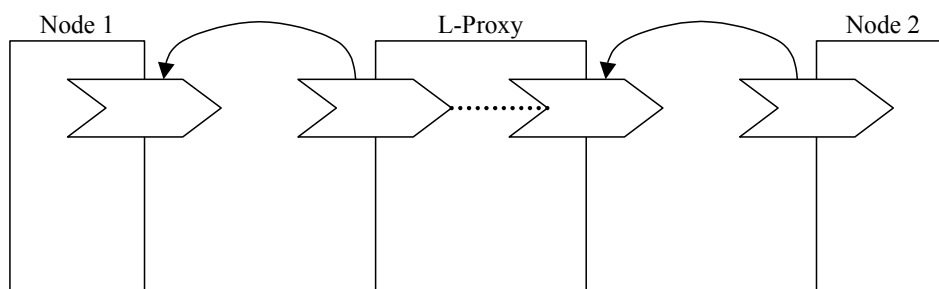


Figure 3: Poll-Poll use case

2.3 Update-Poll Use Case

Figure 4 shows an Update-Poll use case. In this use case the input network variable on L-Proxy is bound to an output network variable on Node 1. This output network variable on Node 1 is periodically updated. On the output side of L-Proxy the corresponding output network variable is not bound. Node 2 periodically polls this network variable.

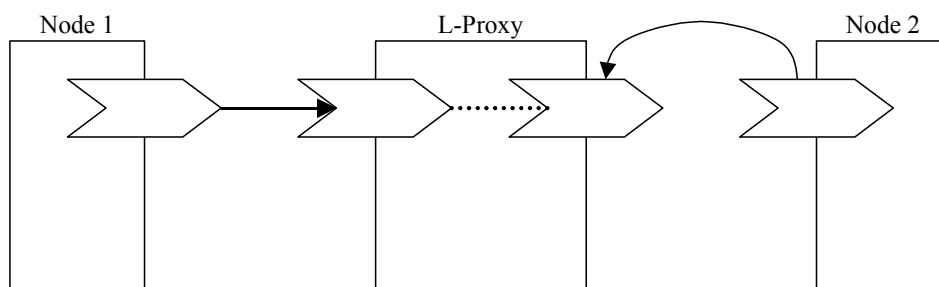


Figure 4: Update-Poll use case

2.4 Poll-Update Use Case (Active Poll)

Figure 5 shows a Poll-Update use case. In this use case the input network variable on L-Proxy is bound to an output network variable on Node 1. However, this output network variable on Node 1 is declared polled and never updated; Node 1 waits for incoming polls. On the output side of L-Proxy the corresponding output network variable is bound to an input network variable on Node 2, which is waiting for updates. This use case is also called active poll use case since L-Proxy actively polls the output network variable on Node 1.

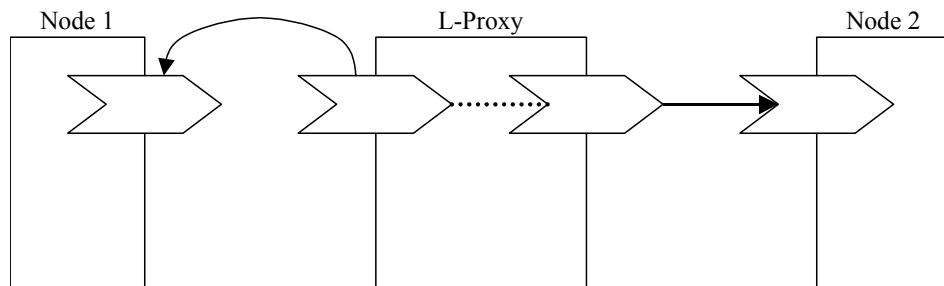


Figure 5: Poll-Update use case (active poll).

2.5 Use Case Combinations

There can be combinations of the different use cases. An example where Update-Update and Update-Poll are combined for one NV is shown in Figure 6. On the input side of L-Proxy an output NV is bound to the input NV of L-Proxy. Updates are received periodically. On the output side of L-Proxy an input network variable on Node 2 is bound to the output NV on L-Proxy (Update-Update use case). Further, an OPC server polls the same output NV on L-Proxy periodically (Update-Poll use case).

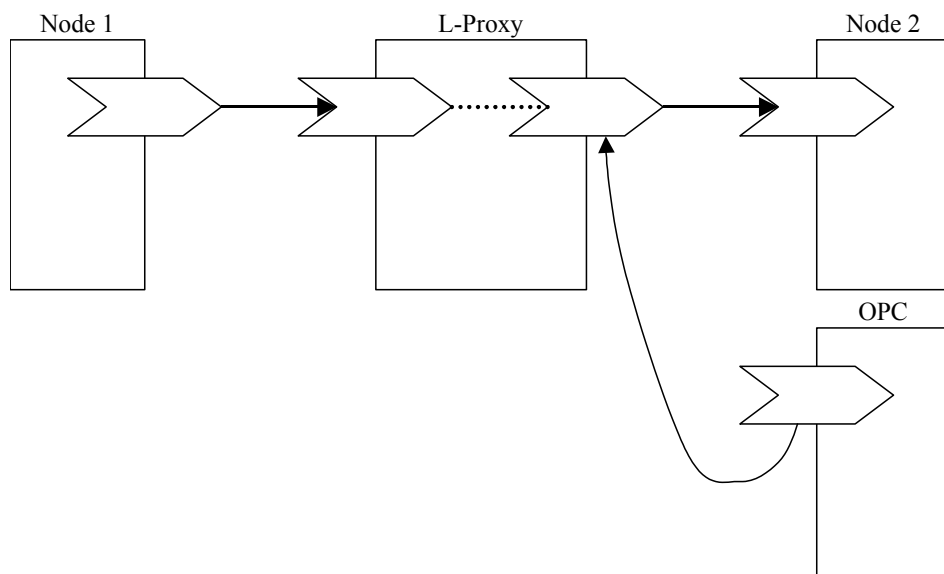


Figure 6: Combination of two basic use cases Update-Update and Update-Poll.

Another possible example for such a combination (Update-Update and Update-Poll) is shown in Figure 7. This use case is a variation of the Update-Update use case. The only difference is, that Node 2 does not wait for the first update to arrive after power-up or reset. Rather, it polls for an initial value after it was started and waits for updates thereafter.

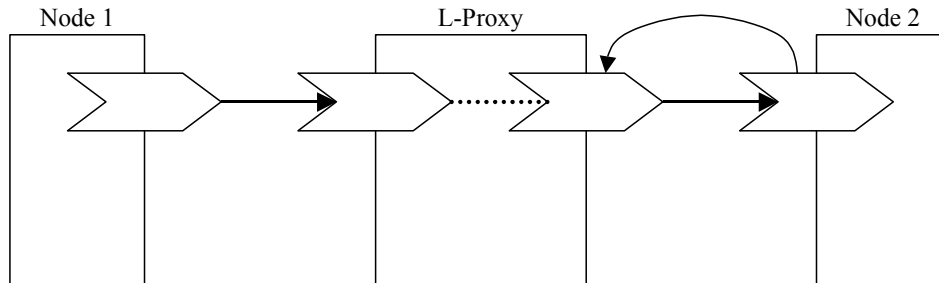


Figure 7: Combination where Node 2 gets an initial value through polling.

2.6 Poll Cache

If Node 2 doesn't receive network variable updates from the source node (Node 1) but rather polls Node 1 to update its input network variables, L-Proxy supports different network variable caching strategies in order to support a wide variety of desired behaviors.

Figure 8 shows the network variable *cache* memory inside L-Proxy. The cache can be used in different operating modes.

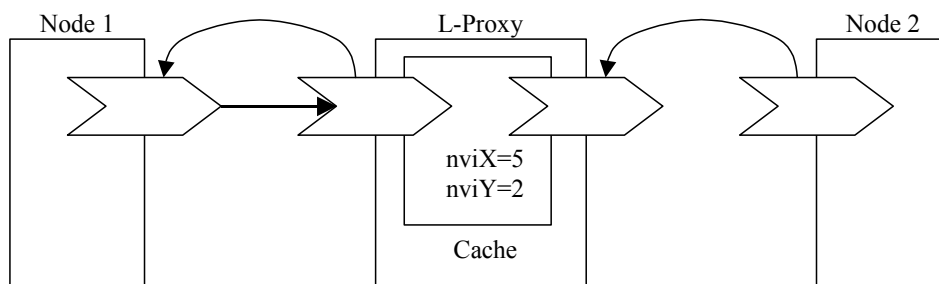


Figure 8: Poll cache inside L-Proxy. The cache is updated with every NV update and every poll response.

2.6.1 Passive Poll

Passive poll means that polling a network variable on Node 1 (see Figure 8) is always initiated by the destination node (Node 2) and never by L-Proxy itself. The behavior of this mode can be configured by the "maximum cache age" property, while having the "poll cycle" property set to zero. There are the following choices (a summary is given in Table 1):

No Cache: Polls from Node 2 are directly forwarded to Node 1. A poll response is sent to Node 2 after the poll response was received from Node 1. If Node 1 doesn't respond to the poll request also L-Proxy doesn't respond to the poll request from Node 2. This behavior can be used to detect "dead" (not responding) nodes. This mode is typically used in poll-poll or

update-update use cases. You can configure this behavior by setting “maximum cache age” to zero.

Poll on Startup: Polls from Node 2 are never forwarded to Node 1 except after power-up when the cache value is not valid. The cache content is updated with network variable updates (no polls) from Node 1. Only after power-up of L-Proxy, when the cache entry is not valid, L-Proxy will try to poll Node 1 until a valid value is received and stored in the cache. This behavior can be achieved by setting “maximum cache age” to ‘-1’ and setting the “poll on startup” option to “yes”.

Enable: The cache is enabled and a timeout in seconds must be specified. If the value in the cache is current (cache timeout has not expired since last update) the poll request from Node 2 reads the value from the cache. If the cache is expired the poll request from Node 2 will be forwarded to Node 1 and the L-Proxy will not respond to Node 2 until the poll response from Node 1 has been received. This mode can be used to detect dead nodes while keeping the network traffic low. For this mode “maximum age” must be set to the desired cache timeout value.

Behavior	Pollycycle	Poll-on-Startup	Max Cache Age
Passive Poll, no cache	0	No	0
Passive Poll, poll-on-startup	0	Yes	-1
Passive Poll, cache	0	No	>0
Active Poll, forward polls	>0	No	0
Active Poll, value from last poll cycle	>0	No	-1

Table 1: Timing Parameters.

2.6.2 Active Poll

Active poll means that L-Proxy actively polls the source node (Node 1) periodically at a specified poll rate. If in addition to the active polls from L-Proxy the destination node (Node 2) or some other node polls the source node (Node) 1, L-Proxy supports two strategies. This mode can be configured by setting the “poll cycle” property to the desired interval between the periodic polls and change the “maximum cache age” property to achieve one of the following behaviors (a summary is given in Table 1):

Forward polls: The poll request from Node 2 is interleaved with the active polls from L-Proxy in order to update the cache value right away. The poll response is sent to Node 2 after the poll response has been received from Node 1. This mode is configured by setting the “maximum cache age” property to zero.

Use value from last poll cycle: The poll request from Node 2 returns the current value from the cache (last active poll cycle). The cache value is not updated. This mode is configured by setting the “maximum cache age” property to ‘-1’.

Active polls can be used if a node cannot send updates (e. g. electric meter) and the destination node (e. g. SCADA system) cannot poll a value. L-Proxy can then periodically poll the electric meter and send an NV update to the SCADA system.

2.6.3 Poll strategy for multiple input network variables

In the case that multiple input network variables are connected to an output NV, the first input network variable in the connection is trying to send out a poll. In case this input NV is not configured for polling no poll will be sent out.

In the example in Figure 9 the poll request would only be forwarded to Node 1.

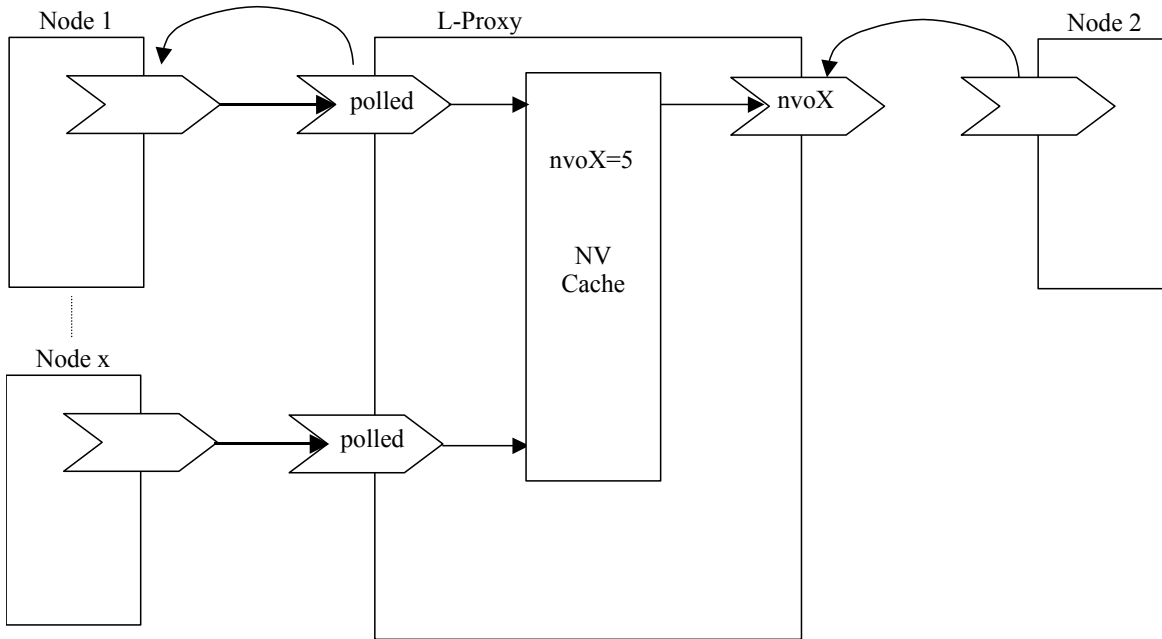


Figure 9 The first input NV with the polled attribute set updates the cache value.

2.7 SNVT Conversion

The L-Proxy starting with firmware version 3.0 supports automatic SNVT conversion for scalar types. In general there are the following requirements for SNVT conversion:

- A. **Integer to Float conversion (I2F/F2I):** This conversion type converts an integer value (signed or unsigned) to a float value (signed or unsigned) or vice versa. The type of both values must be a SNVT with the same SI unit (e.g. SNVT_temp to SNVT_temp_f).
- B. **Integer to Integer conversion (I2I):** This conversion type converts an integer value (signed or unsigned) to another integer value (signed or unsigned) or vice versa. The type of both values must be a SNVT with the same SI unit (e.g. SNVT_temp to SNVT_temp_p).
- C. **Enumeration conversion:** This type converts one enumeration value to another enumeration value. If the range of one enumeration value is left its value is set to the first value of the enumeration, which typically is the “invalid”-value.
- D. **Structure conversion:** This type converts one or more structure values to one or more other structure values (e.g. multiple SNVT_switch to a single SNVT_state).

3 Quick-Start Guide

This Chapter shows step-by-step instructions on how to configure the L-Proxy for a simple network architecture, mapping EIA-709 network variables from different ports of the L-Proxy.

3.1 Hardware installation

Connect power (9-35 VDC or 12-24 VAC), the EIA-709 network, and the Ethernet cable as shown in Figure 10. More detailed instructions are shown in Chapter 4.

Important: *Do not connect terminal 17 with ground!*

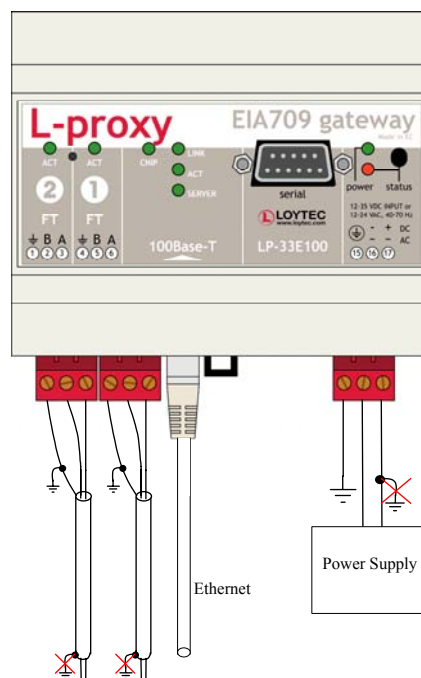


Figure 10: Basic Hardware Installation

3.2 Configuration of the L-Proxy

The L-Proxy can be configured via a console interface or via the Web interface. To configure the L-Proxy, the following steps have to be performed:

1. Setup IP configuration (see Sections 3.2.1 and 3.2.2).
2. Setup proxy configuration (see Section 3.3).

Note: This setup procedure assumes the use of the IP interface. Alternatively, a configuration via the console interface is possible. See Chapter 5 for details.

3.2.1 IP Configuration on the console

Use a PC terminal program with the communication settings set to 38,400 bps / 8 data bits / no parity / 1 stop bit / no handshake. To connect COM1 of the PC to the Console on the L-Proxy, use a standard null-modem-cable with full handshaking. Power up the L-Proxy or press Return if the L-Proxy is already running. The following menu should appear on the terminal:

```
Device Main Menu
=====

[1]  Show device information
[2]  Serial firmware upgrade
[3]  System configuration
[4]  EIA-709 configuration
[5]  IP configuration
[6]  EIA-852 device configuration
[7]  BACnet configuration
[8]  Reset configuration (factory defaults)
[9]  Device statistics

[a]  Data Points

[0]  Reset device

Please choose:
```

Figure 11: L-Proxy Main Menu

Select 5 from the L-Proxy Configuration Menu and enter the IP address, netmask, and gateway address. Note that you must use different IP addresses if you are using multiple L-Proxys in your setup.

```
IP Configuration Menu
=====

[1]  DHCP                      : disabled
[2]  IP Address                 : 192.168.1.254
[3]  IP Netmask                 : 255.255.255.0
[4]  IP Gateway                 : 192.168.1.1
[5]  Hostname                   : new
[6]  Domainname                 : <unset>
[7]  DNS Servers                : <unset>
[9]  MAC Address                : 00:0A:B0:01:0C:9F (factory default)
[b]  Link Speed & Duplex        : Auto Detect

[q]  Quit without saving
[x]  Exit and save

Please choose:
```

Figure 12: Enter basic IP settings.

Press x to save the IP settings and reset the L-Proxy with the main menu item 0 in order to let the new IP settings take effect.

3.2.2 IP Configuration via the Web-Interface

Optionally to using the console interface one can also use the Web interface to configure the client device. In a Web browser enter the default IP address 192.168.1.254 of the L-Proxy. Note that if your PC has an IP address in a subnet other than 192.168.1.xxx please open a command tool and enter the following route command to add a route to the L-Proxy:

Windows START => Run

command.com

```
route add 192.168.1.254 %COMPUTERNAME%
```

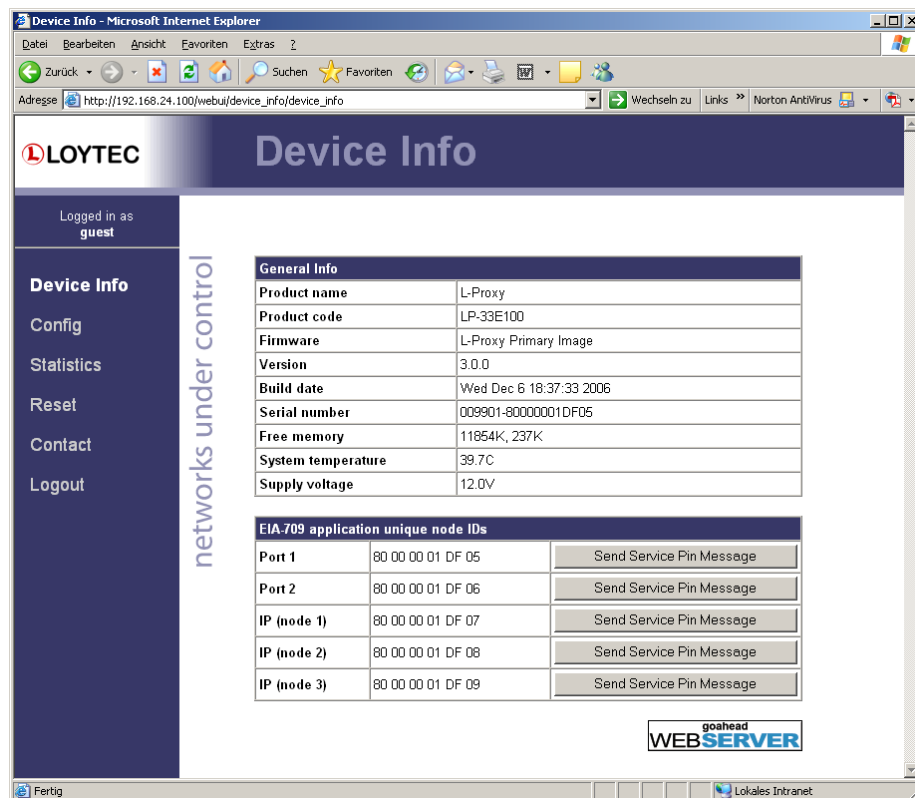


Figure 13: Example Start Screen

The start screen is shown in Figure 13. Click on “Config” in the left menu. You will be asked to enter the administrator password in order to change the IP settings. Enter “admin” and select Login as depicted in Figure 14.

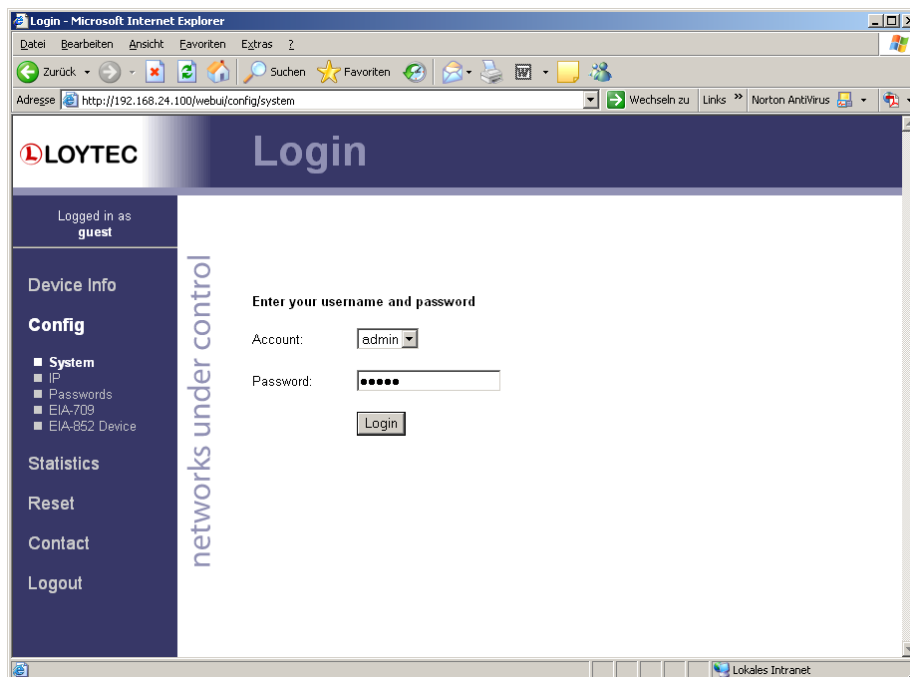


Figure 14: Enter admin as the default administrator password.

The Config menu opens. Click on IP in the Config menu and enter the IP address, the IP netmask, and IP gateway for this L-Proxy as shown in Figure 15.

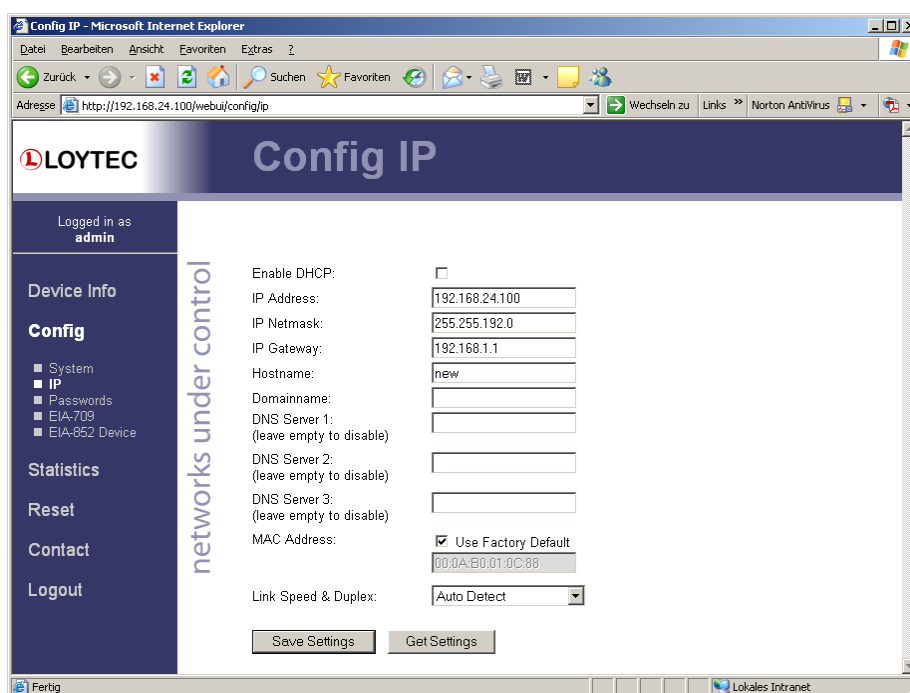


Figure 15: Enter IP address and gateway.

Press Save Settings and then reset the device by selecting “reset” in the highlighted text. This changes the IP settings of the L-Proxy.

3.3 Configuration with LNS-based Tools

This section describes a quick start scenario for the L-Proxy. In this scenario network variables of nodes connected to Port 1 (FT) shall be exposed as static NVs on Port 2 (FT). The two ports can be in different LNS databases and in different domains.

First, install the L-Gateway configuration software from the setup.exe. This file can be downloaded from www.loytec.com. In your LNS-based tool register the L-Gateway configuration software as an LNS plug-in.

Then open an LNS database and add an L-Proxy device for Port 1 (FT) using the installed XIF files (e.g., L-Proxy V3_0 FT-10). Configure the added device with the L-Gateway LNS plug-in. This opens the main connections screen of the software as shown in Figure 16. Note that the device status is displayed as “Configured” on the right-hand side below the tool bar.

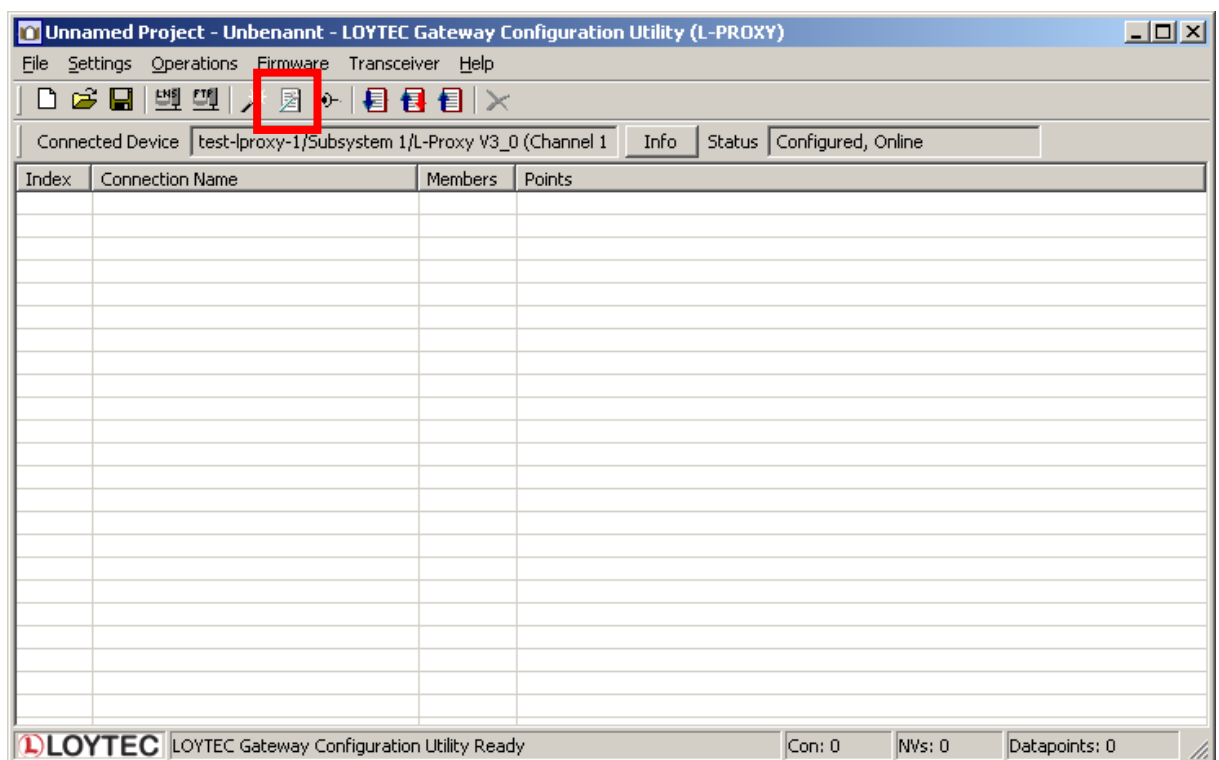


Figure 16: Main screen of the L-Gateway configuration software.

Click on the “Open Datapoint Manager” button in the tool bar. This opens the data point manager dialog. In that dialog click on the “Scan Channel” button in the tool bar as depicted in Figure 17.

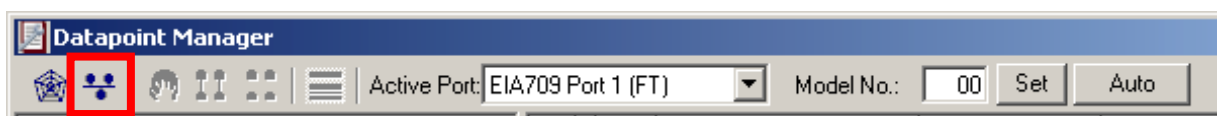


Figure 17: Scan channel button in the data point manager tool bar.

This populates the “LNS Database Scan” folder with all network variables, which are found on nodes connected to the same channel as L-Proxy Port 1. The result is shown in Figure 18.

Select the data points in the LNS Database Scan folder, which you want to expose to Port 2, and click on the “Use on device” button in the tool bar. This populates the folder “EIA709 Port 1” with the data points.

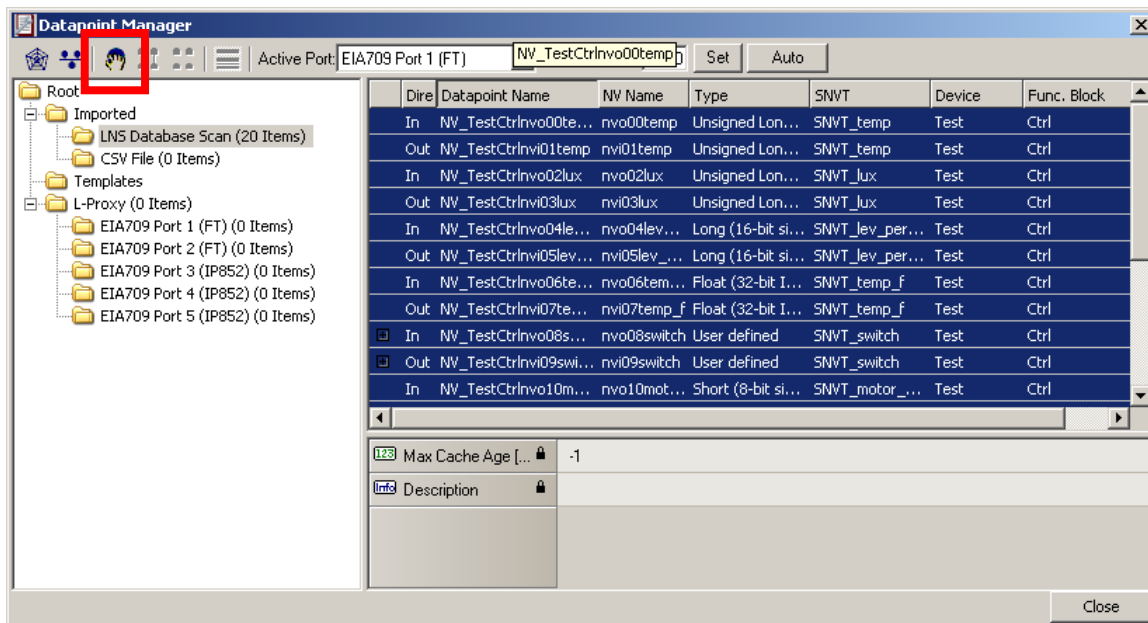


Figure 18: Select all data points, which have been found.

Then switch to Port 2 in the tool bar as indicated in Figure 19.

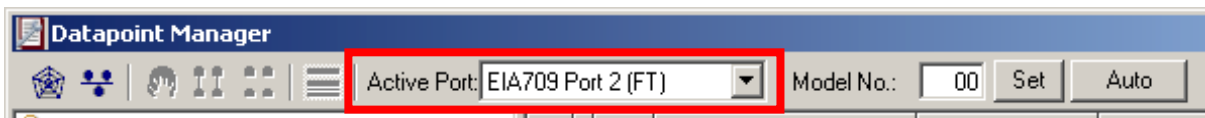


Figure 19: Switch to Port 2 in the tool bar.

Select all data points on Port 1, which shall be mapped over to Port 2. Then click on “Generate points and auto-generate connections” button in the tool bar as shown in Figure 20.

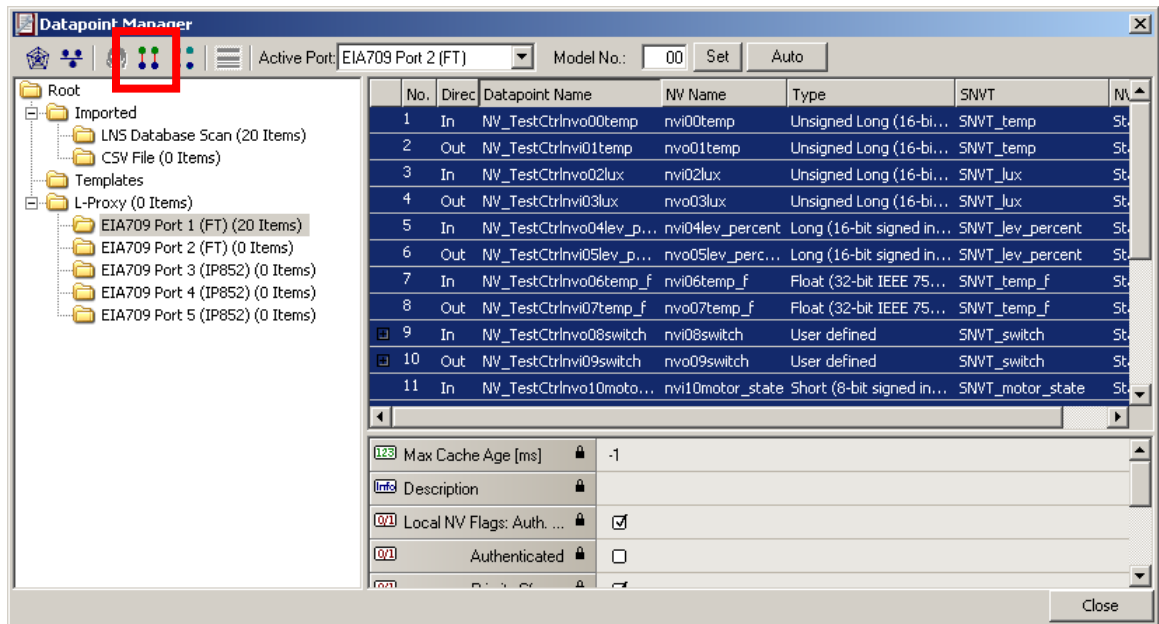


Figure 20: Select all points on Port 1.

This creates exact copies of the NVs on Port 1 as static NVs on Port 2 using the opposite direction. The result of that operation is depicted in Figure 21.

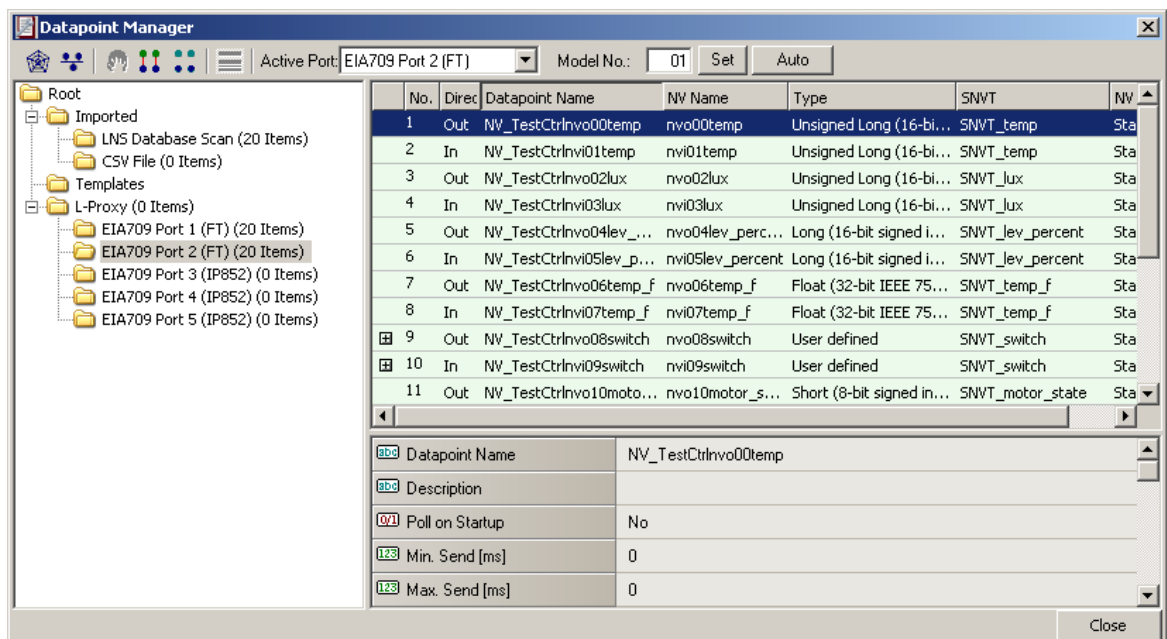


Figure 21: Generated static NVs on Port 2.

Change back to Port 1 in the tool bar as indicated by Figure 22.



Figure 22: Change back to Port 1 in the tool bar.

The “Generate points and auto-generate connections” button also creates internal connections between the NVs on Port 1 and Port 2. Close the data point manager dialog and view the generated connections in the main window as shown in Figure 23.

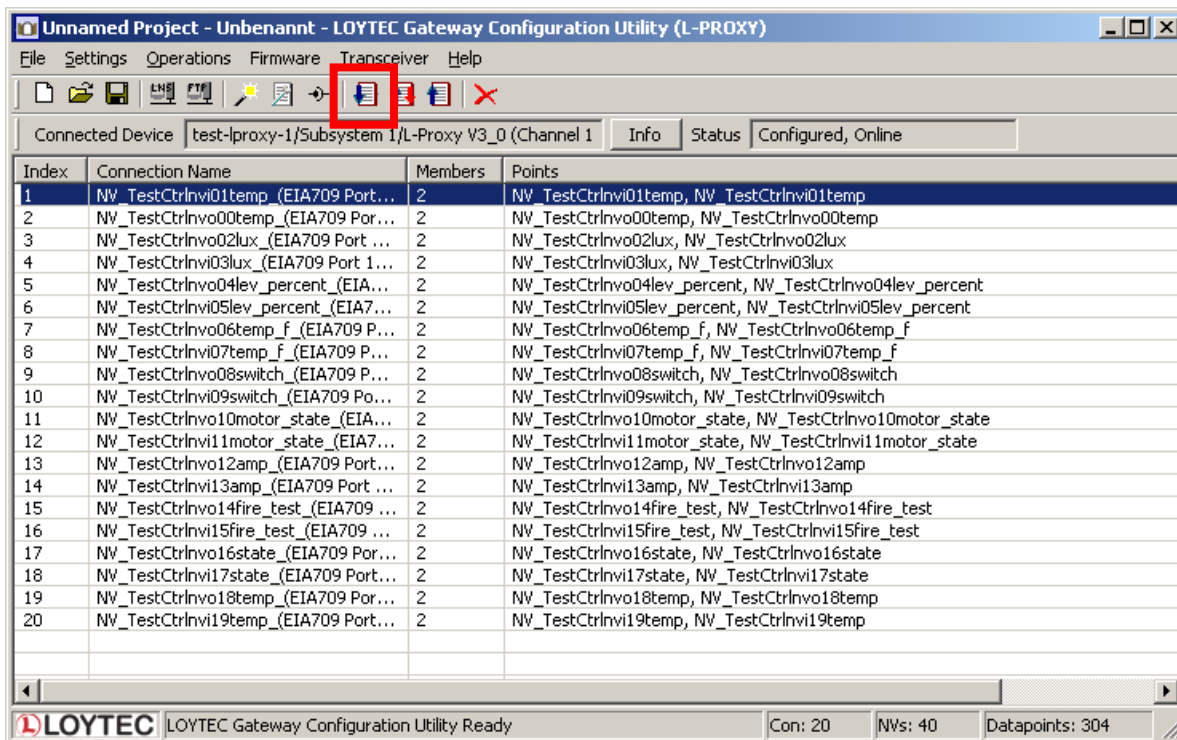


Figure 23: Select all data points, which have been found.

Finally, click on the “Download Configuration” button in the tool bar. This opens the configuration download dialog as shown in Figure 24. Click on “Start” to initiate the download process. The dialog shows the currently executed tasks. The software automatically creates bindings to the network variables, which have been scanned in on Port 1.

Configuration Download - EIA709 Port 1 (FT)

Target LNS AppDevice

Name: L-Proxy V3_0

Channel: Channel 1

Subnet: 1

Node: 84

Program ID: 9000D74600FF0400

Neuron ID: 80000001DF05

IP Address: 192.168.24.100

Firmware: 3.0.0

Model Number: 01

Task List

No	Task	Status
1	Download the configuration	OK
2	Cleanup old dynamic NVs	OK
3	Commission device	OK
4	Reboot the device	Working...
5	Upgrade the Device	
6	Commission device	
7	Create bindings	
8	Register on new device template	

4%

LNS Options

☒ Automatically create bindings

☐ Overwrite existing bindings

Controls

Figure 24: Download the configuration to the L-Proxy.

Click OK when the download is finished and close the download dialog. It is recommended to save the L-Proxy project to a disk file. Select File|Save As ... and enter a suitable file name in the file requestor. The project file is stored as a .gtw file.

After the configuration process, the selected NVs from Port 1 are available on Port 2 as static NVs. To use them on Port 2, add Port 2 to a second LNS database and upload the device interface. The NVs of Port 2 can then be bound to other devices in the second LNS database. Any updates on the NVs of the devices connected to Port 1 are then propagated to Port 2 and vice-versa.

4 Enclosure and Installation

4.1 Enclosure

4.1.1 LP-33E100

The L-Proxy enclosure is 6 TE (1 TE = 17.5 mm) wide for DIN rail mounting, following DIN 43 880 (see Figure 25).

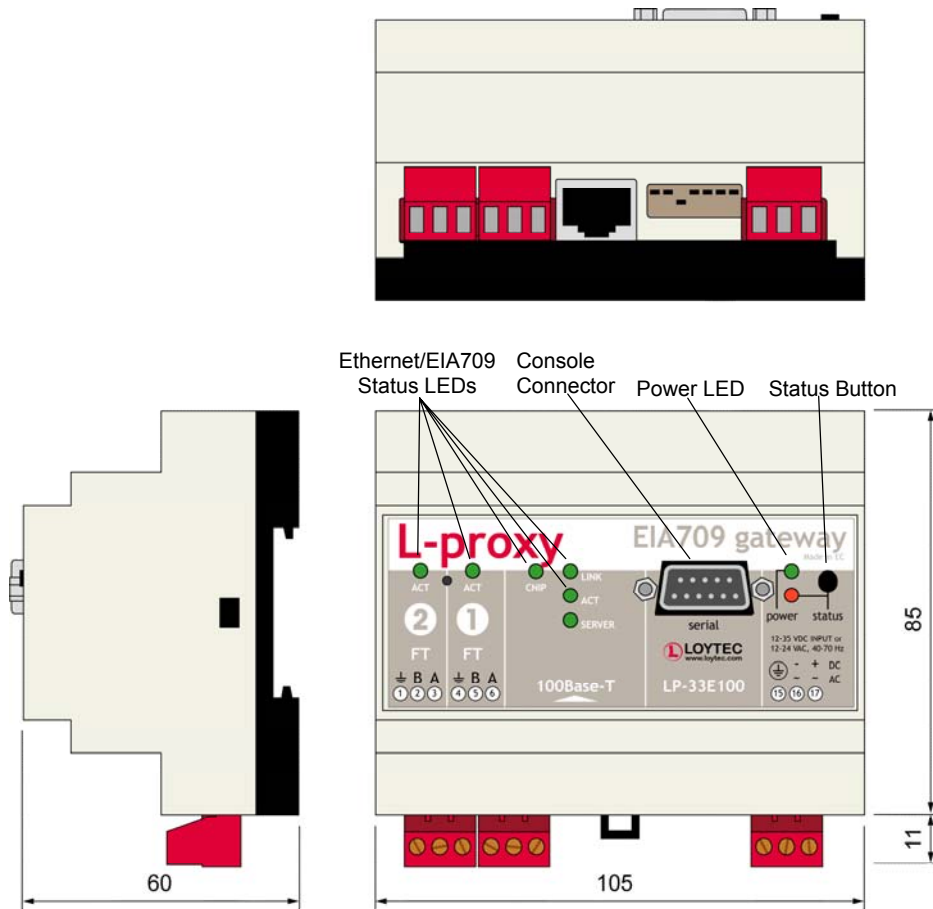


Figure 25: L-Proxy Enclosure (dimensions in mm)

4.2 Product Label

The product label on the side of the L-Proxy contains the following information (see Figure 26):

- ◆ L-Proxy order number with bar-code (e.g., LP-33E100),
- ◆ serial number with bar-code (Ser#),
- ◆ unique node IDs and virtual ID of each port (e.g., NID1, VID1),

- ◆ Ethernet MAC ID (MAC1).

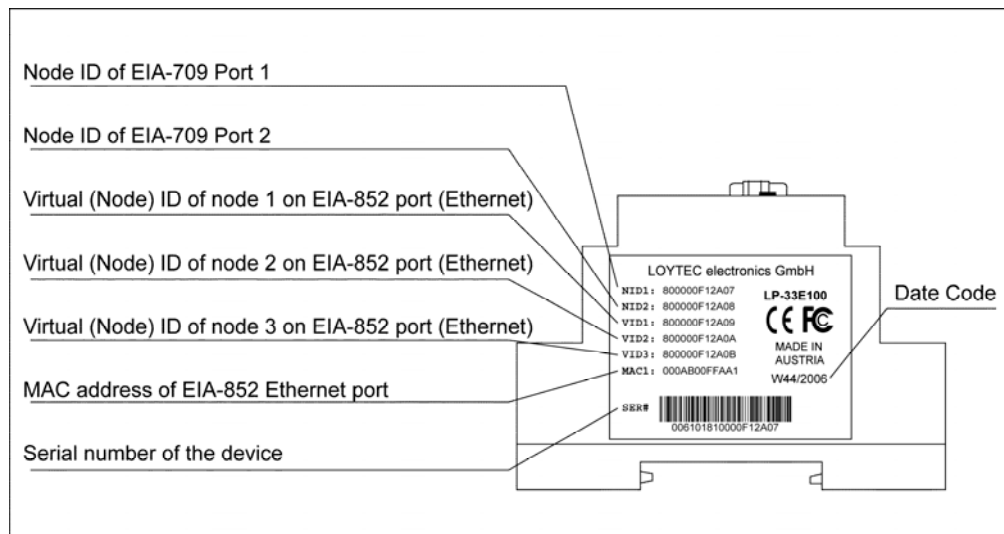


Figure 26: L-Proxy product label

Unless stated otherwise, all bar codes are encoded using “Code 128”. An additional label is also supplied with the L-Proxy for documentation purposes. A virtual ID (VID) is a Node ID on the IP channel.

4.3 Mounting

The device comes prepared for mounting on DIN rails following DIN EN 50 022.

The device can be mounted in any position. However, an installation place with proper airflow must be selected to ensure that the L-Proxy's temperature does not exceed the specified range (see Section 15).

4.4 LED signals

4.4.1 Power LED

The L-Proxy power LED lights up green when power is supplied to terminals 15, 16, and 17.

4.4.2 Status LED

The L-Proxy is equipped with a red status LED (see Figure 25). This LED is normally off.

During boot-up the status LED is used to signal error conditions (red).

4.4.3 FT Activity LED

The FT port on the L-Proxy has a three-color LED (green, red, and orange, see Figure 25). Table 2 shows different LED patterns of the port and their meaning.

Behavior	Description	Comment
GREEN flashing fast	Traffic	
GREEN flashing at 1Hz	L-Proxy is unconfigured	
RED permanent	Port damaged	
RED flashing at 1 Hz (all ports)	Firmware image corrupt Please upload new firmware	

Table 2: EIA-709 Activity LED Patterns

4.4.4 Ethernet Link LED

The Ethernet Link LED lights up green whenever an Ethernet cable is plugged-in and a physical connection with a switch, hub, or PC can be established.

4.4.5 Ethernet Activity LED

The Ethernet Activity LED lights up green for 6 ms whenever a packet is transmitted or received or when a collision is detected on the network cable.

4.4.6 CNIP LED

The CNIP LED is a three color LED that indicates different operating states of the L-Proxy's EIA-852 device.

Green: The EIA-852 device is fully functional and all EIA-852 configuration data (channel routing info, channel membership list, send list) are up-to-date.

Green flicker: If a valid EIA-709 packet is received or transmitted over the IP channel the CNIP LED turns off for 50 ms. Only valid EIA-709 IP packets sent to the IP address of the L-Proxy can be seen. Stale packets or packets not addressed to the L-Proxy are not seen.

Yellow: Device is functional but some configuration data is not up-to-date (device cannot contact configuration server but has configuration data saved in Flash memory)

Red: Device is non-functional because it was rejected from the EIA-852 IP channel or shut-down itself due to an internal error condition.

Off: Device is non-functional because the EIA-852 router module has not started. This can be the case if the L-Proxy uses DHCP and it has not received a valid IP configuration (address) from the DHCP server.

Flashing Red at 1 Hz: Device is non-functional because the EIA-852 router module is started but has not been configured. Please add the device to a EIA-852 IP channel (register in configuration server).

Flashing green or orange at 1 Hz: None of the nodes on the EIA-852 side of the L-Proxy have been commissioned yet. The color indicates the EIA-852 IP channel status as described above.

4.4.7 Wink Action

If the L-Proxy receives a wink command on any of its network ports, it shows a blink pattern on the CNIP and the EIA-709 activity LEDs. The EIA-709 activity and the CNIP LED turn green/orange/red (each 0.15 s). This pattern is repeated six times. After that, the LED of the port on which the wink was received flashes orange six times. After that the L-Proxy LEDs return to their normal behavior.

4.5 Status Button

The L-Proxy is equipped with a status button (see Figure 25). When pressing the status button shortly during normal operation of the L-Proxy, it sends a “Service Pin Message” on each network port. Note that every L-Proxy port has its own unique node ID (“Neuron ID”).

Pressing the status button longer than 2 seconds will allow you to select the port to send out the “Service Pin Message” message: The port LED of the currently selected port will light up orange. After 2 seconds the next available port will be selected. When the status button is released the “Service Pin Message” is sent out on the currently selected port. As an alternative to pressing the status button, a service pin message can be sent via the Web interface (see Section 6.1).

The status button can also be used to switch the device back to factory default state. Press the service button and power-cycle the device. Keep the button pressed until the port LEDs illuminate orange. Release the button within five seconds from that time on to reset the device to factory defaults. Alternatively, the device can be switched back to factory defaults over the console UI (see Section 5.8.1).

4.6 DIP Switch Settings

The L-Proxy has seven switches to select the mode of operation. The DIP switch assignment for the L-Proxy is shown in Table 3.

DIP Switch #	Function	Factory Default
1	Reserved	OFF
2	Reserved	OFF
3	Reserved	ON
4	Must be OFF	OFF
5	Reserved	OFF
6	Reserved	OFF
7	Reserved	OFF

Table 3: DIP Switch Settings for L-Proxy

4.7 Power Supply

The L-Proxy can either be DC or AC powered. The L-Proxy power terminals are listed in Table 4.

Terminal	Function	Note
15	Main Earth Ground	
16, 17	Power Inputs	12-35 VDC or 12-24 VAC ± 10%

Table 4: Power Terminals on LP-33E100.

Important: *Do not ground the power supply wire on terminal 17 as shown in Figure 27!*

4.8 Terminal Layout

The L-Proxy provides screw terminals to connect to the network as well as to the power supply. The screw terminals can be used for wires of a maximum thickness of 1.5 mm²/AWG12.

Terminal	Function
1	Earth Ground
2, 3	EIA-709 A, B of FT Channel Port 2
4	Earth Ground
5, 6	EIA-709 A, B of FT Channel Port 1
8	Ethernet 100BaseT
15	Main Earth Ground
16, 17	Power Supply (do not connect 17 to ground)

Table 5: L-Proxy Terminals LP-33E100.

4.9 Wiring

The EIA-709 network segment connected to the L-Proxy needs to be terminated according to the rules found in the specification of the transceiver (see Section 7).

Important: *All Earth ground terminals must be connected to the main Earth ground terminal 15. When using shielded network cables only one side of the cable should be connected to ground. Thus, the shield must be connected to earth ground either at the L-Proxy terminals or somewhere else in the network, but never at more than one place (see Figure 27)!*

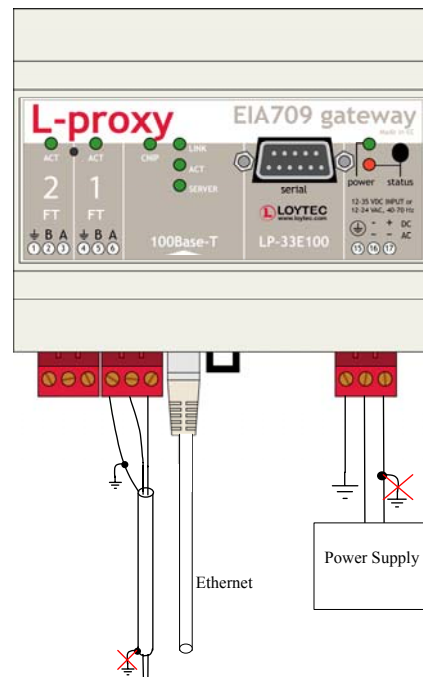


Figure 27: Connecting the Earth Ground to the L-Proxy.

5 Console Interface

5.1 Console Connection

The L-Proxy is equipped with a serial interface to

- ◆ display the results of the self test,
- ◆ allow configuration via a console menu,
- ◆ upgrade the L-Proxy firmware.

To use the serial interface, the console connector (see Figure 25) of the L-Proxy can be connected to the RS-232 port of a PC. The PC can communicate with the L-Proxy using a standard terminal program with communication settings of 38,400 bps / 8 data bits / no parity / 1 stop bit. Use a standard null-modem cable with full handshaking to connect the L-Proxy serial console interface to your PC.

5.2 Self Test

Whenever the L-Proxy comes out of reset it performs a self-test.

The console output of a successful boot sequence on an L-Proxy reads as follows:

```
LOYTEC electronics GmbH
www.loytec.com
```

Testing Board ID (0)	Passed
Testing RAM	Passed
Testing boot loader	Passed
Testing fallback image	Passed
Testing primary image	Passed
Testing Flash	Passed

Loading primary image	Passed
-----------------------	--------

```
Bootloader version 2
L-Proxy Primary Image loading...
Firmware version 3.0.0
```

```
Type bootshell to enter the boot shell...
```

Mounting file system	Passed
Starting TCP/IP networking	Passed
Starting FTP server	Passed
Starting TELNET server	Passed
Starting EIA-852 device	Passed
Detecting EIA-709 port 1 (FT)	Passed
Detecting EIA-709 port 2 (FT)	Passed
Starting EIA-709 networking	Passed
Starting Web server	Passed

```
L-Proxy(c)
LOYTEC electronics GmbH
```

Tue Dec 5 14:18:24 2006 - V3.0.0

Figure 28: Console messages during the boot phase.

The duration of a successful boot sequence of an L-Proxy is typically 45 seconds.

5.3 L-Proxy Device Main Menu

After booting has completed, the L-Proxy displays the console menu as shown in Figure 29.

```
Device Main Menu
=====
```

```
[1] Show device information
[2] Serial firmware upgrade
[3] System configuration
[4] EIA-709 configuration
[5] IP configuration
[6] EIA-852 device configuration
[8] Reset configuration (factory defaults)
[9] Device statistics

[a] Data Points

[0] Reset device
```

Please choose:

Figure 29: L-Proxy Device Main Menu.

The menu items are described in the following sections.

5.3.1 Option 1 – Show device information

This menu item shows information about the L-Proxy and the current firmware version. The output should look like what is shown in Figure 30.

```
Device Information
=====

Product:      L-Proxy
Product code: LP-33E100
Firmware:     L-Proxy Primary Image
Version:      3.0.0
Build date:   Tue Dec  5 14:18:24 2006
Serial number: 009901-80000001DF05
Free memory:  11830K,237K
System temp:  40.7C
Supply volt:  12.0V

EIA-709 application unique node IDs
=====

Port 1       : 80 00 00 01 DF 05
Port 2       : 80 00 00 01 DF 06
IP (node 1)  : 80 00 00 01 DF 07
IP (node 2)  : 80 00 00 01 DF 08
IP (node 3)  : 80 00 00 01 DF 09

Press <RETURN> to continue
```

Figure 30 : Device Information

5.3.2 Option 2 – Serial firmware upgrade

This menu item allows updating the L-Proxy firmware via the serial interface (console). See Section 11.2 for detailed instructions.

Note: If you select this option accidentally, you can return to the main menu by sending a break signal. In case your terminal program does not offer an option to send a break signal, the device must be reset to return to the main menu.

5.3.3 Option 3 – System configuration

Select this menu item to change system configuration settings. See Section 5.4 for details.

5.3.4 Option 4 – EIA-709 configuration

Select this menu item to change the EIA-709 configuration settings. See Section 5.5 for details.

5.3.5 Option 5 – IP configuration

Select this menu item to change the IP configuration settings like IP address, default gateway, DHCP, and MAC address. See Section 5.6 for details.

5.3.6 Option 6 – EIA-852 client configuration

Select this menu item to change the EIA-852 client configuration settings like configuration server IP address, device name, SNTP server, escrow timeout, aggregation timeout, MD5 authentication secret. See Section 5.7 for details.

5.3.7 Option 8 – Reset configuration (factory defaults)

This menu item resets the L-Proxy to factory defaults. See Section 5.8 for details.

5.3.8 Option 9 – Device statistics

Select this menu item to display advanced IP, EIA-852 device, and statistics information like number of packets sent and received, number of channel members, etc. See Section 5.9 for details.

5.3.9 Option a – Data Points

Select this menu item to display information about configured data points on the L-Proxy.

5.3.10 Option 0 – Reset Device

Select this menu item to reboot the L-Proxy. Some configuration changes require to reboot the device. Note, that this option does not reset the configuration.

5.4 System Configuration Menu

The system configuration menu holds various system configuration settings. Typically the system configuration menu looks like shown in Figure 31.

```
System Configuration Menu
=====

[7]  FTP server           : enabled
[8]  FTP server port      : 21 (default)
[9]  Web server           : enabled
[0]  Web server port      : 80 (default)

[q]  Quit without saving
[x]  Exit and save

Please choose:
```

Figure 31: System Configuration Menu

5.4.1 Option 7 – FTP server, 8 – FTP server port

Allows to enable and disable the FTP server and configure the FTP server port. Press <7> to toggle between enabled and disabled. Press <8> to change the FTP server port. To use the default port, enter 0 when asked for the port number. The FTP server can be used to download a data point configuration or update the firmware (see Section 11.1).

5.4.2 Option 9 – Web server, 0 – Web server port

These menu items allow enabling and disabling the Web server and configuring the Web server port on the L-Proxy. You can disable the Web server if you do not want to provide access to the L-Proxy configuration via the Web interface. Press <9> to toggle between

enabled and disabled. Press <0> to change the Web server port. To use the default port, enter 0 when asked for the port number.

5.5 EIA-709 Configuration Menu

This menu allows to change the EIA-709 port of the L-Proxy. The menu looks like shown in Figure 32.

```
EIA-709 Configuration Menu
=====

Port 1          : FT
Port 2          : FT
IP              : IP-852

[q]  Quit without saving
[x]  Exit and save

Please choose :
```

Figure 32: EIA-709 Configuration Menu

5.6 IP Configuration Menu

The IP configuration menu holds relevant IP settings. Here are some general guidelines for setting IP addresses, port numbers, and time values.

Enter **0.0.0.0** to clear an IP address.

Enter **0** to select the default port number.

Enter **0** to disable a time setting.

Press **Return** to keep the current setting.

The IP configuration menu, when DHCP is disabled, is shown in Figure 33.

```
IP Configuration Menu
=====

[1]  DHCP          : disabled
[2]  IP Address    : 192.168.1.254
[3]  IP Netmask    : 255.255.255.0
[4]  IP Gateway    : 192.168.1.254
[5]  Hostname      : new
[6]  Domainname    : <unset>
[7]  DNS Servers   : <unset>
[9]  MAC Address   : 00:0A:B0:01:0C:88 (factory default)
[b]  Link Speed & Duplex : Auto Detect

[q]  Quit without saving
[x]  Exit and save

Please choose :
```

Figure 33: IP Configuration Menu when DHCP is disabled

The IP configuration menu, when DHCP is enabled, is shown in Figure 34.

```
IP Configuration Menu
=====

[1]  DHCP                      : enabled
      IP Address                : 192.168.1.254
      IP Netmask                : 255.255.255.255
      IP Gateway                : 0.0.0.0
[5]  Hostname                  : new
      Domainname                : <unset>
      DNS Servers               : <unset>
[9]  MAC Address               : 00:0A:B0:01:0C:88 (factory default)
[b]  Link Speed & Duplex       : Auto Detect

[q]  Quit without saving
[x]  Exit and save

Please choose :
```

Figure 34: IP Configuration Menu when DHCP is enabled

5.6.1 Option 1 – DHCP

Switches between manual entry of the IP address, netmask, and gateway address or automatic configuration from a DHCP server. If DHCP is disabled, one must enter the configuration data described in the following sections. If DHCP is enabled, please skip menu items 2 through 7.

Press <1> to toggle between “DHCP enabled” and “DHCP disabled”.

5.6.2 Option 2 – IP Address, 3 – IP Netmask, 4 – IP Gateway

Please enter the IP address for the L-Proxy, the netmask (e.g., 255.255.255.0), and the default gateway address.

5.6.3 Option 5 – Hostname, 6 – Domainname

“Hostname” and “Domainname” are optional entries and can be left empty. For some DHCP configurations it may be necessary to enter a hostname. Please contact your system administrator to get information on how to configure DHCP to acquire an IP address.

5.6.4 Option 7 – DNS Servers

You can configure up to 3 Domain Name Servers. Currently, these entries are not used.

5.6.5 Option 9 – MAC Address

The L-Proxy comes configured with a unique MAC address. This address can be changed in order to clone the MAC address of another device. It can be dangerous to change the MAC address. Please contact your system administrator to avoid MAC address conflicts. After selecting menu item 9 the following message appears.

```
Override factory MAC address (y/n):
```

Enter “y” to input a new MAC address or enter “n” to clear the current MAC address and return to the factory default MAC address.

5.6.6 Option b – Link Speed & Duplex

If the L-Proxy is operated with an old 10Mbit/s-only hub, the link speed should be switched from “Auto Detect” to “10Mbps/Half-Duplex”. With modern 100/10Mbit/s switches this setting can be left at its default (Auto Detect).

Change Link Speed & Duplex

```
[1] Auto Detect (default)
[2] 100Mbps/Full-Duplex
[3] 100Mbps/Half-Duplex
[4] 10Mbps/Full-Duplex
[5] 10Mbps/Half-Duplex
```

5.7 EIA-852 Device Configuration Menu

This menu holds relevant information regarding the configuration of the EIA-852 device. In principle, there are two ways to add the L-Proxy to an IP channel. The recommended method is to enter the information at the configuration server. The configuration server will then contact the L-Proxy and configure the relevant information. If for some reason the L-Proxy shall contact the configuration server on its own behalf (e.g., as an auto-member) one can enter the configuration data directly into this menu. Then the L-Proxy starts to contact the configuration server to register. The device configuration menu is shown in Figure 35.

EIA-852 Device Configuration Menu

```
[2] Config server address      : <unset>
[3] Config server port        : 1629 (default)
[4] Config client port        : 1628 (default)
[5] Device name                :
    Channel mode               : Standard
    Pri. SNTP server           : <unset>
    Sec. SNTP server           : <unset>
    Channel timeout            : off
[6] Escrow timeout             : on (64 ms)
[7] Aggregation timeout       : on (16 ms)
[8] MD5 authentication        : off
[9] MD5 secret                : not displayed
[0] Location string           : unknown
[a] NAT address               : Auto (no NAT)
[b] Multicast address         : <unset>

[q] Quit without saving
[x] Exit and save
```

Please choose:

Figure 35: EIA-852 Device Configuration Menu

In case that the configuration server contacts the L-Proxy, only the MD5 secret in menu item 8 must be entered, if authenticated communication is required. In networks that communicate over the Internet one may also experiment with the escrow timeout in menu item 5.

5.7.1 Option 2 – Config server address, 3 – Config server port

Please enter the IP address and port of the configuration server if the L-Proxy needs to contact the configuration server. Enter “0” for the configuration server port if you want to return to the default port setting.

5.7.2 Option 4 – Config client port

If only one L-Proxy is used in an IP-852 channel behind a NAT router, this field should be left at the default setting (1628). If changed, it must not be the same as the configuration server port.

5.7.3 Option 5 – Device name

You can enter a device name with up to 15 characters. It is recommended to use unique device names.

5.7.4 Channel Mode

This field reflects the current channel mode of the device. It is configured by the configuration server. If there are any two devices in the channel which use the same IP address but different ports (e.g. multiple L-Proxys behind one NAT router), the channel switches to “Extended NAT mode”. Please refer to the L-IP User's Manual to learn more about configuring the Extended NAT mode in the configuration server.

5.7.5 SNTP server, channel timeout

The configuration server sets the SNTP server addresses and the channel timeout.

5.7.6 Option 6 – Escrow timeout

Defines how long the EIA-852 device on the L-Proxy waits for out-of-sequence EIA-852 data packets before they are discarded. Please enter the time in ms or 0 to disable escrowing. The maximum time is 255 ms.

5.7.7 Option 7 – Aggregation Timeout

Defines the time interval in which multiple EIA-709 packets are combined into a single EIA-852 data packet. Please enter the time in ms or 0 to disable aggregation. The maximum time is 255 ms. Note that disabling aggregation will negatively affect the performance of the EIA-852 device of the L-Proxy.

5.7.8 Option 8 – MD5 authentication

This menu item enables or disables MD5 authentication. Note that MD5 authentication cannot be used together with the i.LON 1000 since the i.LON 1000 is not fully compliant with the EIA-852 authentication method. MD5 can be used with the i.LON 600.

5.7.9 Option 9 – MD5 secret

Enter the 16-byte MD5 secret. Note that for security purposes the active MD5 secret is not displayed. Either enter the 16 bytes as one string or with spaces between each byte.

e.g. 00 11 22 33 44 55 66 77 88 99 AA BB CC DD EE FF

5.7.10 Option 0 – Location string

Enter a location string with a maximum length of 255 characters. This is optional and for informational purposes only.

5.7.11 Option a – NAT Address

If the EIA-852 device on the L-Proxy is used behind a NAT router, the public IP address of the NAT router or firewall must be known. This address can either be entered manually or can be determined automatically. Automatic NAT router discovery allows to operate the EIA-852 device of the L-Proxy behind a NAT router or firewall, which has a dynamic public IP address, and determines the correct NAT address from an L-IP CS. This is the default setting.

Enable automatic NAT router discovery (y/n):

Figure 36: Enable/Disable automatic NAT Router Discovery

To enable/disable automatic NAT router discovery select this menu option. The question in Figure 36 will be prompted on the console. Choose 'y' to enable automatic NAT router discovery. To manually enter a NAT address, choose 'n' and enter the NAT address when requested to do so. To completely disable the NAT router support, choose 'n' and enter the IP address 0.0.0.0 when requested to enter the NAT address.

If an L-Proxy uses automatic NAT router discovery and the NAT address is known beforehand, the L-Proxy can simply be added to the channel in the L-IP configuration server by specifying the NAT address and correct port. If the NAT address is not known, take the following steps to add the L-Proxy to an EIA-852 IP channel in the configuration server:

1. On the L-Proxy turn on automatic NAT router discovery (this is the default setting). The NAT address should show "Auto (no NAT)".
2. Enter the IP address of the configuration server in the EIA-852 device configuration menu. Exit and save but do not reboot.
3. Go back to the main menu. Wait 15 seconds.
4. Go to the IP configuration menu. The NAT address should show the public IP address of the NAT router or firewall (e.g. "Auto (198.18.76.1)").
5. On the configuration server, add the L-Proxy to the configuration server using this IP address.

5.7.12 Option b – Multicast Address

This menu option allows the user to add the EIA-852 device of the L-Proxy into a multi-cast group for the EIA-852 IP channel. Enter the channel's IP multi-cast address here. Please contact your system administrator on how to obtain a valid multi-cast address. Refer to the L-IP User's Manual to learn when it is beneficial to use multi-cast addresses in your channel.

5.8 Reset configuration (load factory defaults)

This menu item allows to reset the device into its factory default state. The menu appears as shown in Figure 37.

```
Reset Configuration Menu
=====

[1]  Reset everything to factory defaults
[3]  Reset all passwords

[q]  Quit

Please choose:
```

Figure 37: Reset to Factory Defaults Menu

5.8.1 Option 1 – Reset everything to factory defaults

Select this menu item to reset the complete device to factory defaults (including error log, configuration files, passwords, etc.).

5.8.2 Option 3 – Reset all passwords

Select this menu item to reset all passwords (Web interface, FTP server, etc.) to factory defaults.

5.9 Device Statistics Menu

This menu holds relevant information regarding the device statistics of the L-Proxy. The device statistics menu is shown in Figure 38. Use this menu only for debugging purposes. There is no need to access this menu if the network is running smoothly.

```

Statistics Menu
=====

[1]  Show EIA-852 statistics
[2]  Show EIA-709 application statistics
[4]  Show IP statistics
[6]  Enhanced communications test

[q]  Quit

Please choose:

```

Figure 38: Device Statistics Menu

5.9.1 Option 1 – EIA852 device statistics

A sample console output is shown in Figure 39. The first part displays EIA-852 device statistics, which are part of the standard and are comparable to e.g. the i.LON 600. Press <y> to go on to extended statistics.

```

EIA-852 Device Statistics
=====

Seconds since cleared           : 732
Date/Time of clear (GMT)       : Wed Sep 27 16:18:19 2006
No. Of members                 : 0
LT Packets received            : 0
LT Bytes received              : <unknown>
LT Packets sent                : 0
LT Bytes sent                  : <unknown>
IP Packets sent                : 0
IP Bytes sent                  : 0
IP Packets received            : 0
IP Bytes received              : 0
IP Packets data sent           : 0
IP Packets data received       : 0
LT Stale packets               : 0
RFC Packets sent               : 0
RFC Packets received           : 0
Avg. Aggregation to IP         : <unknown>
Avg. Aggregation from IP       : <unknown>
UDP Packets sent               : 0
TCP Packets sent               : 0
Multi-cast Packets sent        : 0

Show extended EIA-852 device statistics (y/n)?

```

Figure 39: EIA-852 Device Statistics

A sample console output of the extended EIA-852 device statistics is shown in Figure 40. At the end the user is prompted if the statistics shall be cleared. Press <y> to reset all counters to 0.

```

Extended EIA-852 Device Statistics
=====

Session ID                     : 0x0398d1fe
SNTP synchronized              : no
Number of CR member infos      : 0
Current channel routing mode   : CR
Message alloc count            : 0
Dropped failed authentication  : 0

```

```

Dropped invalid frame           : 0
Dropped out-of-sequence        : 0
Dropped duplicates              : 0
Dropped missing timestamp       : 0
Active DC datetime              : 0x00000000
Active CM datetime              : 0x00000000
Active SL datetime              : 0x00000000
Stale DC messages               : 0
Stale CM messages               : 0
Stale SL messages               : 0
Stale CR messages               : 0
Number of DC updates            : 0
Number of CM updates            : 0
Number of SL updates            : 0
Number of CR updates            : 0
CR packets sent to CS           : 0

```

Clear EIA-852 device 1 statistics (y/n)?

Figure 40: Extended EIA-852 Device Statistics

5.9.2 Option 2 – EIA-709 Application Statistics

The EIA-709 statistics menu as shown in Figure 41 lists all EIA-709 ports of the L-Proxy. Select one of the ports to print the EIA-709 statistics data for that specific port.

```

EIA-709 application instances
=====

```

```

[1] Port 1
[2] Port 2
[3] IP (node 1)
[4] IP (node 2)
[5] IP (node 3)

```

Please choose:

Figure 41: EIA-709 Application Instance Selection

A sample console output is shown in Figure 42.

```

EIA-709 application statistics
=====

```

```

Device           : Port 1 (FT)
Node state        : configured/offline (0x06)

Transmission errors : 0
Transmit TX failures : 0
Receive TX full     : 0
Lost messages       : 0
Missed messages     : 0
Layer 2 received    : 0
Layer 3 received    : 0
Layer 3 transmitted : 0
Transmit TX retries : 0
Backlog overflows   : 0
Late acknowledgments : 0
Collisions          : 0

Out buffers used    : 0
In buffers used     : 0

```

```

TCL active           : 0/0
TSPs used            : 0
TSPs deleted         : 0
No TSP available     : 0

L-Chip read error    : 0
L-Chip write error   : 0

Slow mode used       : 0
Active outgoing      : 0/0
Waiting outgoing     : 0/0
Blocked outgoing     : 0/0
Slow mode outgoing   : 0/0

Authentication failed : 0
Authentication attempts : 0

Missed preambles     : 0
Packet RCV interrupted : 0
Long packets         : 0
Packet XMT failed    : 0
RCV buffer full      : 0
RCV packet lost      : 0

```

Figure 42: EIA-709 Application Statistics

5.9.3 Option 4 – IP statistics

A sample console output is shown in Figure 43.

```

***** INTERFACE STATISTICS *****
***** lo0 *****
Address:127.0.0.1
Flags: Up Loopback Running Multicast
Send queue limit:50   length:0   Dropped:0
***** eth0 *****
Address:192.168.0.2   Broadcast Address:192.168.0.255
Flags: Up Broadcast Running Simplex Multicast
Send queue limit:50   length:0   Dropped:0
Network Driver Stats for CS8900 :
    rx ready len -      50          rx loaded len -      0
    rx packets -      931          tx packets -      165
    rx bytes -     78480          tx bytes -     13627
    rx interrupts -    931          tx interrupts -    165
    rx dropped -       0          rx no mbuf -       0
    rx no custers -    0          rx oversize errors -    0
    rx crc errors -    0          rx runt errors -     0
    rx missed errors -    0          tx ok -      165
    tx collisions -    0          tx bid errors -     0
    tx wait for rdy4tx -    0          tx rdy4tx -     0
    tx underrun errors -    0          tx dropped -     2
    tx resends -       0          int swint req -    2094
    int swint res -    2094          int lockup -       0
    interrupts -    3189

***** MBUF STATISTICS *****
mbufs: 512   clusters: 64   free: 14
drops : 0     waits : 0   drains : 0
    free:461      data:51      header:0          socket:0
    pcb :0         rtable :0      htable :0          atable :0
    soname:0       soopts:0      ftable:0          rights:0
    ifaddr:0       control:0      oobdata:0

```

```

***** IP Statistics *****
      total packets received          922
 datagrams delivered to upper level    922
      total ip packets generated here  158

Destination      Gateway/Mask/Hw      Flags      Refs      Use  Expire
Interface
default          192.168.0.1          UGS         6         0      0 eth0
62.178.55.77     192.168.0.1          UGH         0         1    3606 eth0
62.178.95.96     192.168.0.1          UGH         0         1    3606 eth0
81.109.145.243   192.168.0.1          UGH         0         1    3606 eth0
81.109.251.36    192.168.0.1          UGH         0         1    3606 eth0
127.0.0.1        127.0.0.1            UH          0         0      0 lo0
130.140.10.21    192.168.0.1          UGH         1         6      0 eth0
192.168.0.0      255.255.255.0        U           0         0      3 eth0
192.168.0.1      00:04:5A:26:96:1F    UHL         7         0   1722 eth0
213.18.80.166    192.168.0.1          UGH         1        148      0 eth0
***** TCP Statistics *****

***** UDP Statistics *****
      total input packets          924
      total output packets         158

***** ICMP Statistics *****

```

Figure 43: IP Statistics

The IP statistics menu has the additional feature of displaying any IP address conflicts. If the L-Proxy's IP address conflicts with another host on the network, the banner shown in Figure 44 is displayed.

```

WARNING: Conflicting IP address detected!
         IP address 10.125.123.95 also used by device with MAC address
         00 04 5A CC 10 41!

Clear IP conflict history (y/n):

```

Figure 44: IP Address Conflict

As useful information, the MAC address of the conflicting host is shown. If the information about this conflict shall be cleared, hit 'y'. If 'n' is selected, the conflict will show up again the next time this menu is entered.

5.9.4 Option 6 – Enhanced Communications Test

This menu item allows testing the communication path between the EIA-852 device of the L-Proxy and other EIA-852 devices on the IP channel. It tests the EIA-852 data communication. This test can be used to determine if there is a working TCP/IP connection as well as a working EIA-852 connection between the individual devices. The test thoroughly examines the paths between individual members and the configuration server in each direction.

A typical console output is shown in Figure 45.

```

Enhanced Communications Test
=====

Address              Result  RTT(ms)  Comment
-----
192.168.1.253:1629 (CS)  OK      6

```

```

192.168.1.250:1628      OK      6
192.168.1.250:1631      OK      6
192.168.1.37:1628      FAILED  n/a      Peer not reachable

```

Figure 45: Enhanced Communication Test Console Output

The round-trip value (RTT) is measured as the time a packet sent to the peer device needs to be routed back to the EIA-852 device of the L-Proxy. It is a measure for general network delay. If the test to a specific member fails, a text is displayed to describe the possible source of the problem. The reasons for failure are summarized in Table 6.

A warning “Incorrect NAT configuration detected!” is displayed if the enhanced communications test determines that the EIA-852 device of the L-Proxy is operated behind a NAT router, but it has no NAT address configured. In this case, go to the IP configuration menu and configure the correct NAT address or set it to Auto-NAT.

<i>Text displayed (Web icon)</i>	<i>Meaning</i>
OK, Return path not tested (green checkmark)	Displayed for a device which is reachable but which does not support the feature to test the return path (device sending to this EIA-852 device). Therefore a potential NAT router configuration error cannot be detected. If the tested device is an L-IP, it is recommended to upgrade this L-IP to 3.0 or higher.
Not reachable/not supported (red exclamation)	This is displayed for the CS if it is not reachable or the CS does not support this test. To remove this uncertainty it is recommended to upgrade the L-IP to 3.0 or higher.
Local NAT config. Error (red exclamation)	This is displayed, if the EIA-852 device of the L-Proxy is located behind a NAT router and the port-forwarding in the NAT-Router (usually 1628) is incorrect.
Peer not reachable (red exclamation)	Displayed for a device, if it is not reachable. No RTT is displayed. The device is either not online, not connected to the network, has no IP address, or is not reachable behind its NAT router. Execute this test on the suspicious device to determine any NAT configuration problem.

Table 6: Possible Communication Problems

6 Web Interface

The L-Proxy comes with a built-in web server and a web interface to configure the L-Proxy and extract statistics information. The web interface allows configuring the IP settings, EIA-852 settings, and EIA-709 settings. This interface is very simple to use and has an intuitive, self-explanatory user interface.

6.1 Device Information and Account Management

In a Web browser enter the default IP address 192.168.1.254 of the L-Proxy. Note that if your PC has an IP address in a subnet other than 192.168.1.xxx you must open a command tool and enter the following route command to add a route to the L-Proxy:

Windows START → Run

command.com

```
Route add 192.168.1.254 %COMPUTERNAME%
```

Also make sure that the web server has not been disabled in the console interface (see Section 5.4.2). The device information page should appear as shown in Figure 46.

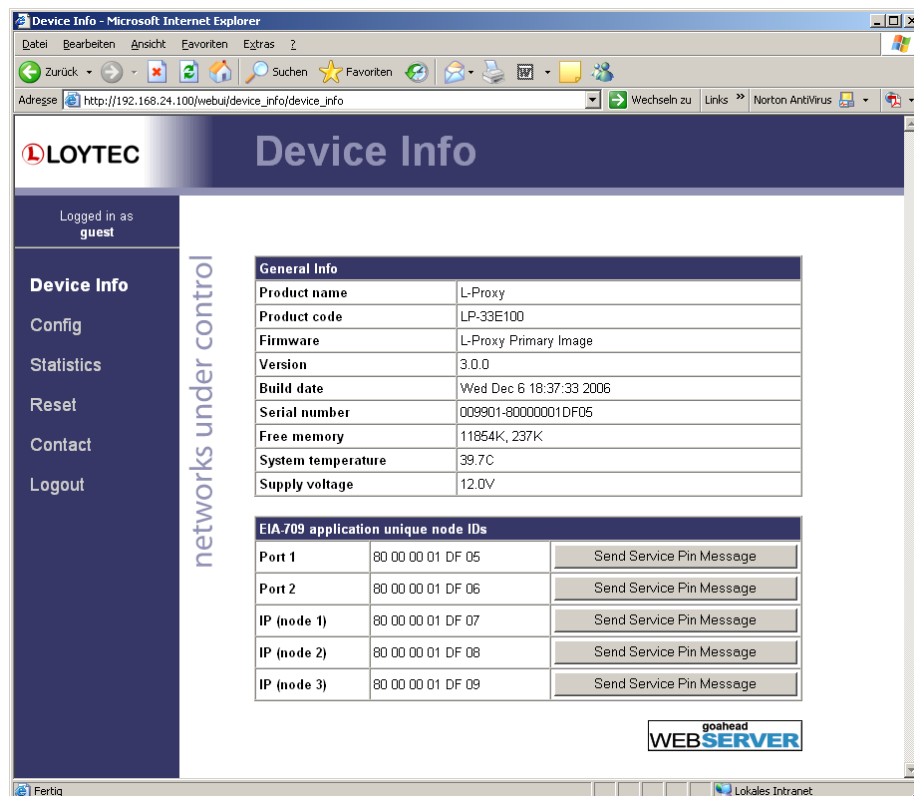


Figure 46: Device Information Page

The device information page shows information about the L-Proxy and the current firmware version. It includes the unique node IDs (“Neuron IDs”) of the EIA-709 network interfaces.

This page can also be used to send the EIA-709 service pin messages. This is a useful feature when commissioning the L-Proxy, since it is not necessary to be on-site to press the device's status button.

Click through the menus on the left hand side to become familiar with the different screens. If you click on "Config" in the left menu you will be asked to enter the administrator password in order to make changes to the settings as shown in Figure 47. Enter the default administrator password "admin" and select "Login".

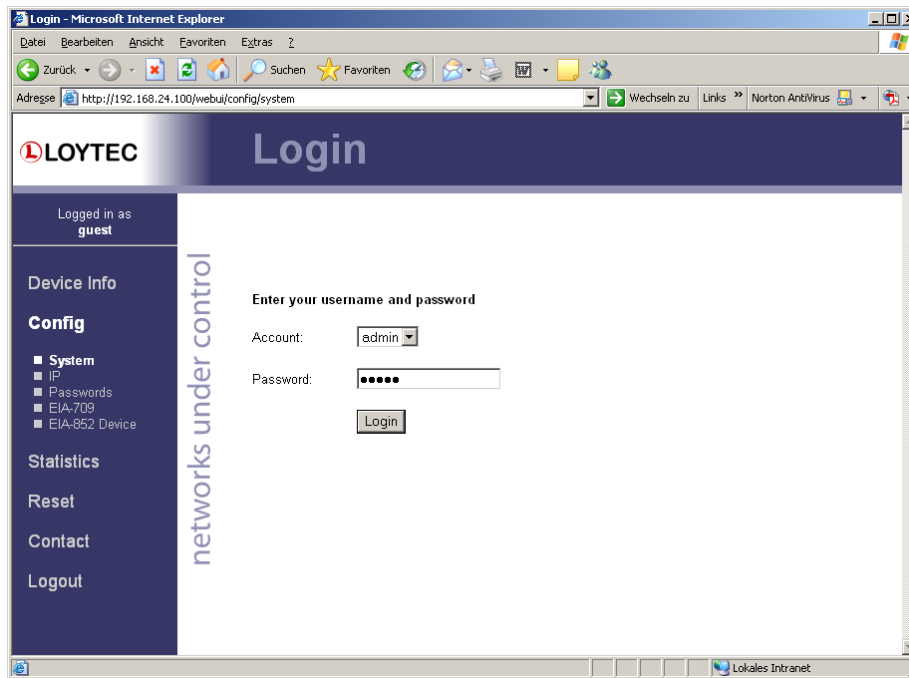


Figure 47: Enter admin as the default administrator password.

The Config menu opens. Click on "Passwords" in the Config menu, which opens the password configuration page as shown in Figure 48. The L-Proxy has two user accounts: (1) "guest" allows the user to view certain information only, e.g. the device info page. By default the guest user has no password. (2) "admin" has full access to the L-Proxy and can make changes to its configuration. Note that the user accounts are also used to log on to the FTP server.

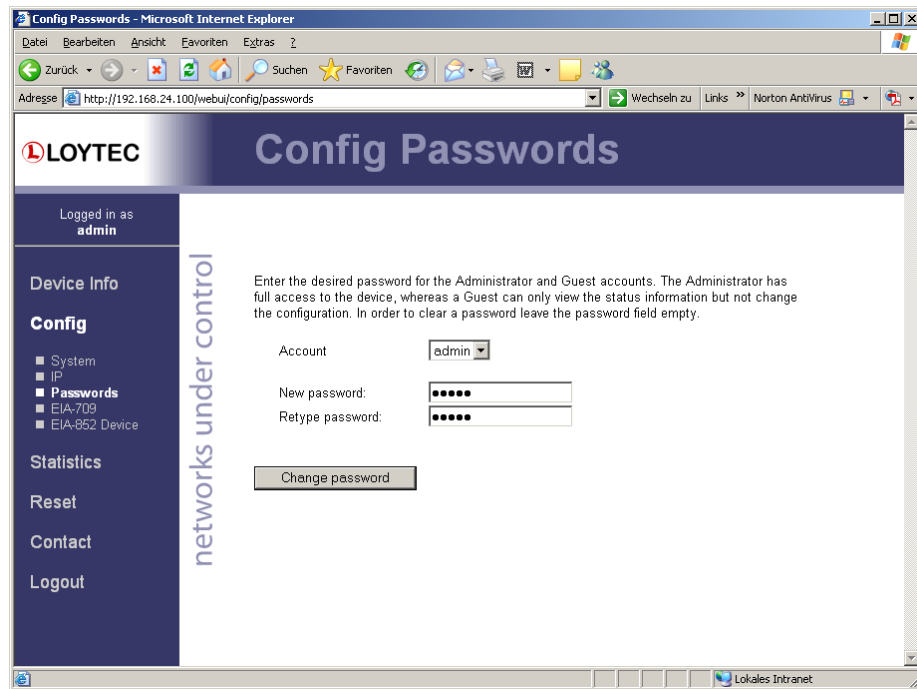


Figure 48: Password Configuration Screen

Please change the administrator password in order to protect yourself from unwanted configuration changes by anyone else. To do so, select the “admin” account in the drop-down box and enter the new password. If the administrator password is left empty, password protection is turned off and everyone can access the L-Proxy without entering a password. Click on “Change password” to activate the change.

6.2 Device Configuration

The device configuration pages allow viewing and changing the device settings of the L-Proxy. Here are some general rules for setting IP addresses, port numbers, and time values:

An empty IP address field disables the entry.
An empty port number field sets the default port number.
An empty time value field disables the time setting.

6.2.1 System Configuration

The system configuration page as shown in Figure 49 allows to enable and disable the FTP server and configure the FTP server port. The FTP server is used for instance to update the firmware (see Section 11.1). Further, the Web server port and the delimiter for CSV files can be configured. Note that the Web server can only be disabled on the console interface.

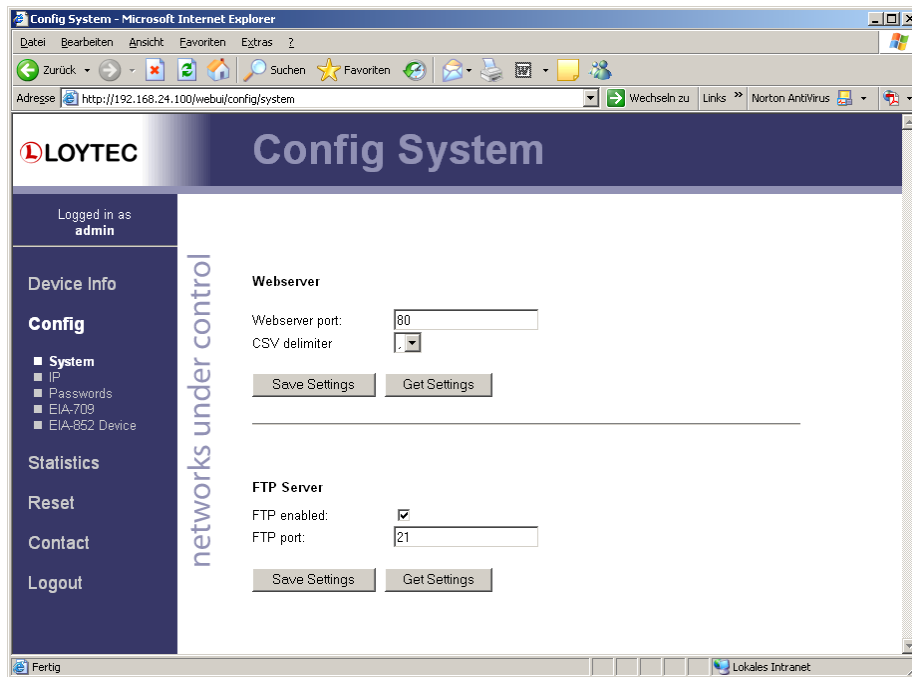


Figure 49: System Configuration Page

6.2.2 IP Configuration

Figure 50 shows the IP configuration page with DHCP disabled, while Figure 51 shows the IP configuration page with DHCP enabled. The “Enable DHCP” checkbox switches between manual entry of the IP address, netmask, and gateway address, and automatic configuration from a DHCP server.

Hostname and domainname are optional entries and can be left empty. For some DHCP configurations it may be necessary to enter a hostname. Please contact your system administrator on how to configure DHCP to acquire an IP address. Further, you can configure up to 3 Domain Name Servers. Currently these entries are not used.

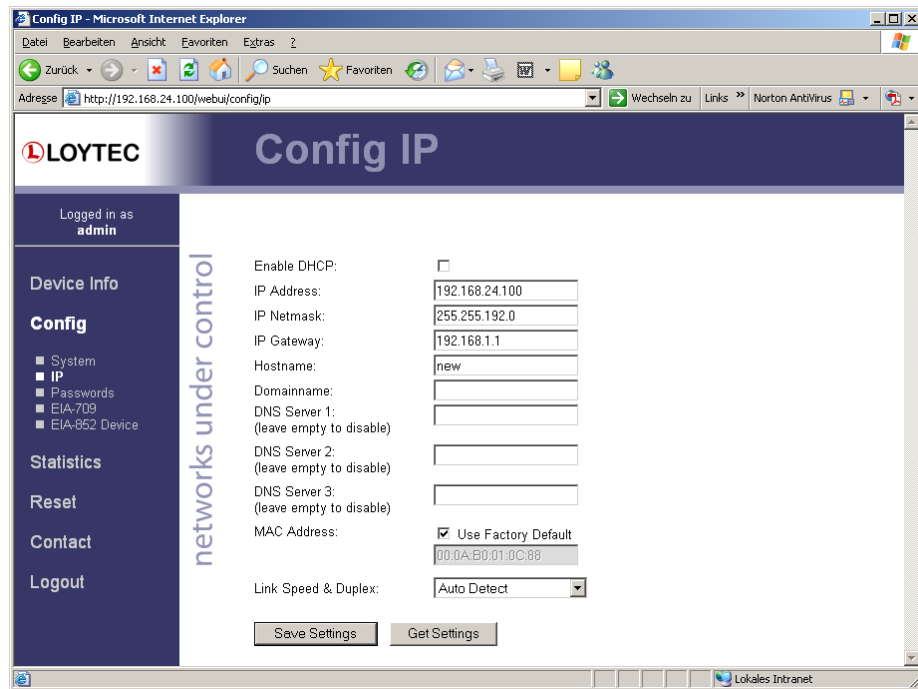


Figure 50: IP Configuration Page with DHCP disabled

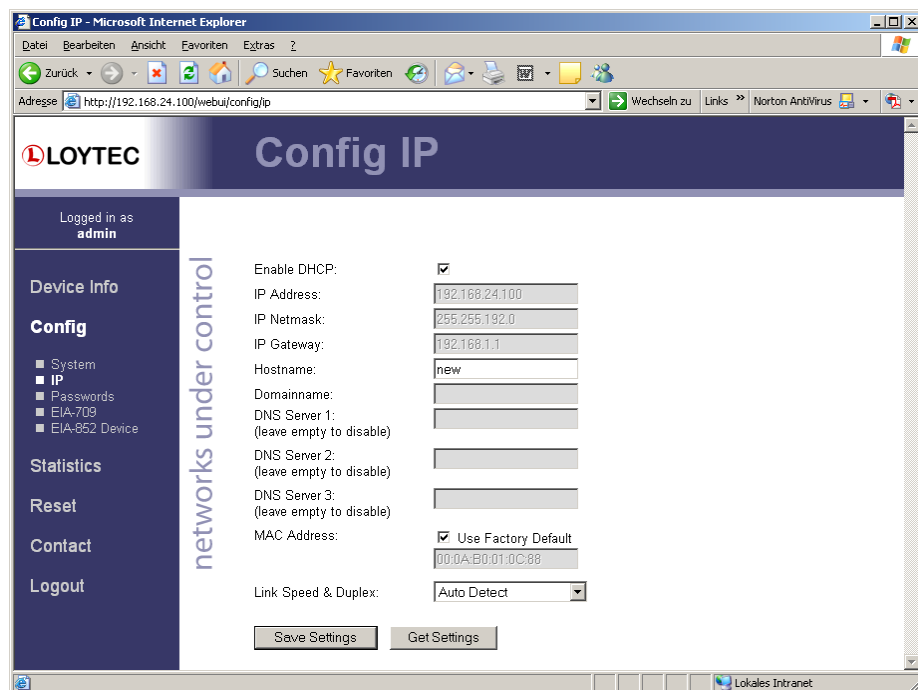


Figure 51: IP Configuration Page with DHCP enabled

The L-Proxy comes configured with a unique MAC address. This address can be changed in order to clone the MAC address of another device. Please contact your system administrator to avoid MAC address conflicts.

If the L-Proxy is operated with a 10Mbit/s-only hub, the link speed should be switched from “Auto Detect” to “10Mbps/Half-Duplex”. With modern 100/10Mbit/s switches this setting can be left at its default.

6.2.3 EIA-709 Configuration

On the EIA-709 configuration page (shown in Figure 52) the user can get information on the physical EIA-709 network ports of the L-Proxy. Click on the tabs “Port 1”, “Port 2” and “IP” to learn about the settings on the respective ports. Note, that the IP port on the L-Proxy hosts three IP-852 interfaces.

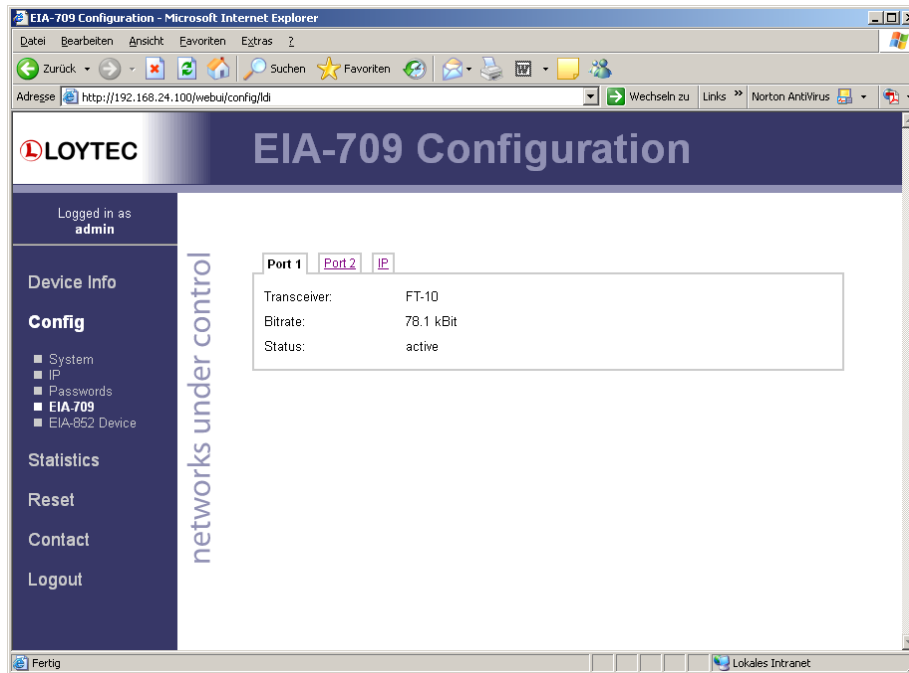


Figure 52 : EIA-709 Configuration Page

6.2.4 EIA-852 Device Configuration

The EIA-852 device of the L-Proxy can be configured in the EIA-852 device configuration page, which is depicted in Figure 53. Typically, the L-Proxy is added to an IP channel by entering the relevant information on a configuration server. The configuration server then contacts the EIA-852 device of the L-Proxy and sends its configuration.

The field “Config server address” and “Config server port” display the IP address and port of the configuration server, which manages the L-Proxy and the IP channel. The field “Config client port” represents the IP port of the L-Proxy’s EIA-852 device. This setting should be left at its default (1628) unless there are more than one EIA-852 device operated behind a single NAT router. Please refer to the L-IP User’s Manual to learn more about NAT configuration.

In the field “Device name” the user can enter a descriptive name for the L-Proxy, which will appear in the IP channel to identify this device. You can enter a device name with up to 15 characters. It is recommended to use unique device names throughout the IP channel.

The “Channel mode” field reflects the current channel mode of the EIA-852 device. It is configured by the configuration server. If there are any two devices in the channel which use the same IP address but different ports (e.g. multiple L-Proxys behind one NAT router) the channel switches to “Extended NAT mode”. Please refer to the L-IP User’s Manual to learn more about configuring the Extended NAT mode in the configuration server.

The configuration server sets the SNTP server addresses and the channel timeout.

The field “Escrow timeout” defines how long the EIA-852 device on the L-Proxy waits for out-of-sequence EIA-852 data packets before they are discarded. Please enter the time in ms or 0 to disable escrowing. The maximum time is 255 ms.

The field “Aggregation timeout” defines the time interval in which multiple EIA-709 packets are combined into a single EIA-852 data packet. Please enter the time in ms or 0 to disable aggregation. The maximum time is 255 ms. Note that disabling aggregation will negatively affect the performance of the EIA-852 device of the L-Proxy.

The field “MD5 authentication” enables or disables MD5 authentication. Note that MD5 authentication cannot be used together with the i.LON 1000 since the i.LON 1000 is not fully compliant with the EIA-852 authentication method. MD5 can be used with the i.LON 600. In the following field “MD5 secret” enter the 16-byte MD5 secret. Note that for security purposes the active MD5 secret is not displayed. Either enter the 16 bytes as one string or with spaces between each byte.

e.g. 00 11 22 33 44 55 66 77 88 99 AA BB CC DD EE FF

Also note that entering the MD5 secret on the Web interface may pose a security risk. Since the information is transmitted over the network it can be subject for eavesdroppers on the line. It is recommended to either use a cross-over cable or enter the secret on the console UI (see Section 5.7).

Enter a location string with a maximum length of 255 characters. This is optional and for informational purposes only.

In the field “Location string” the user can enter a descriptive text which identifies the physical location of the L-Proxy. A location string can have a maximum length of 255 characters. This is optional and for informational purposes only.

If the EIA-852 device on the L-Proxy is used behind a NAT router, the public IP address of the NAT router or firewall must be known. To automatically detect the NAT address leave the “Auto-NAT” checkmark enabled.

The “Multicast Address” field allows the user to add the EIA-852 device of the L-Proxy into a multi-cast group for the EIA-852 IP channel. Enter the channel's IP multi-cast address here. On how to obtain a valid multi-cast address please contact your system administrator. To learn when it is beneficial to use multi-cast addresses in your channel please refer to the L-IP User's Manual.

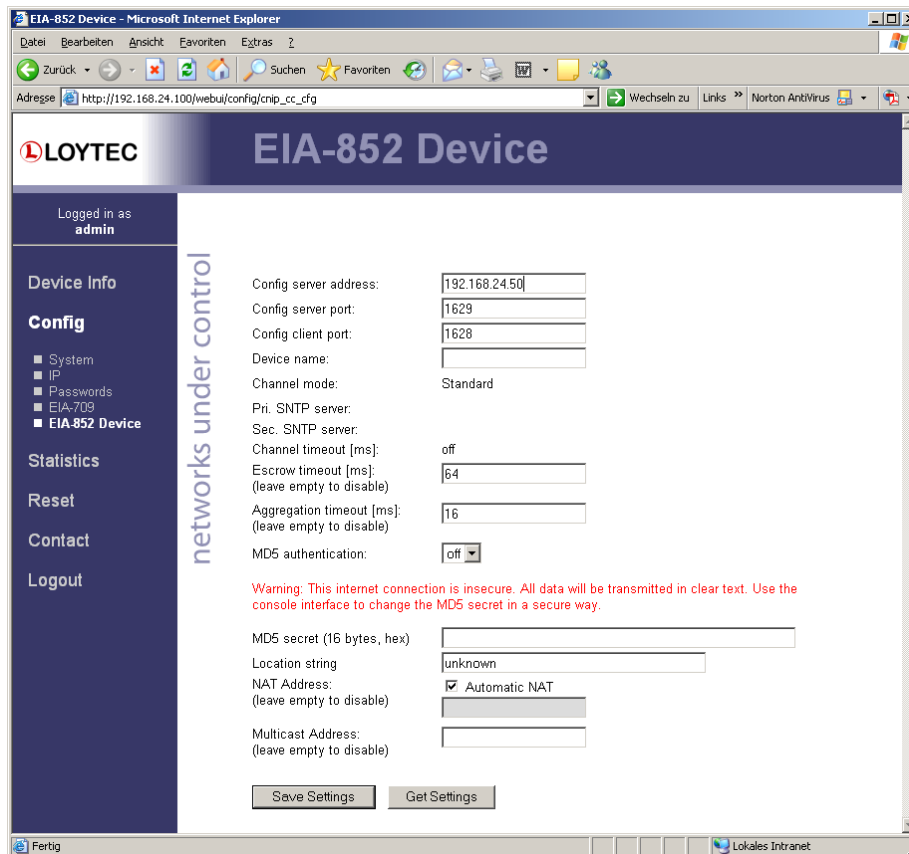


Figure 53 : EIA-852 Device Configuration Page

6.3 Device Statistics

The device statistics pages provide advanced statistics information about the EIA-709 ports, the EIA-852 device, and the Ethernet interface.

6.3.1 IP Statistics

Figure 54 shows the IP statistics page. It allows to find possible problems related to the IP communication. Specifically any detected IP address conflicts are displayed (if the L-Proxy's IP address conflicts with a different host on the network).

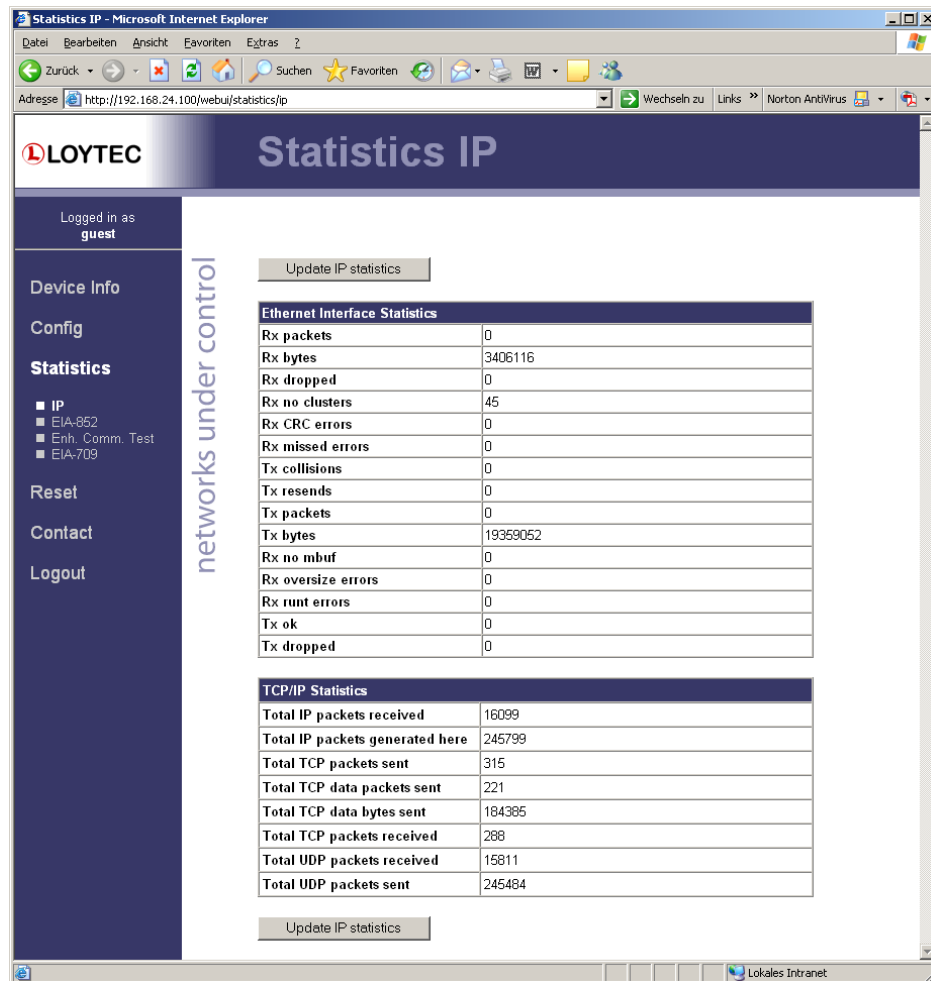


Figure 54: IP Statistics Page

6.3.2 EIA-852 Statistics

The EIA-852 statistics page displays the statistics data of the EIA-852 device on the L-Proxy. The contents are the same as available through the console UI (see Section 5.9.1). The upper part of the EIA-852 statistics page is depicted in Figure 55. To update the statistics data press the button “Update all EIA-852 statistics”. To reset all statistics counters to zero click on the button “Clear all EIA-852 statistics”. The field “Date/Time of clear” will reflect the time of the last counter reset.

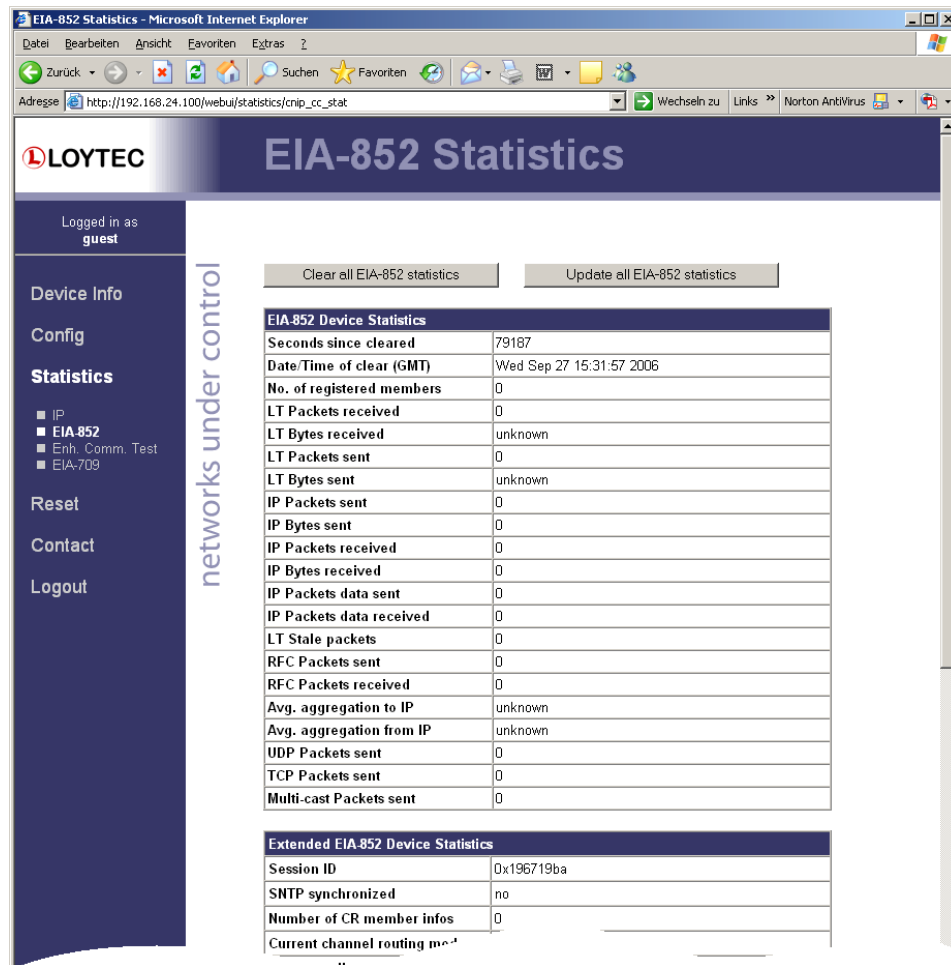


Figure 55: Part of the EIA-852 Statistics Page

6.3.3 Enhanced Communications Test

The Enhanced Communications Test allows testing the EIA-852 communication path between the EIA-852 device on the L-Proxy and other EIA-852 devices as well as the configuration server. The test thoroughly diagnoses the paths between individual members of the IP channel and the configuration server in each direction. Port-forwarding problems are recognized. For older devices or devices by other manufacturers, which do not support the enhanced test features, the test passes as soon as a device is reachable, but adds a comment, that the return path could not be tested. A typical output is shown in Figure 56.

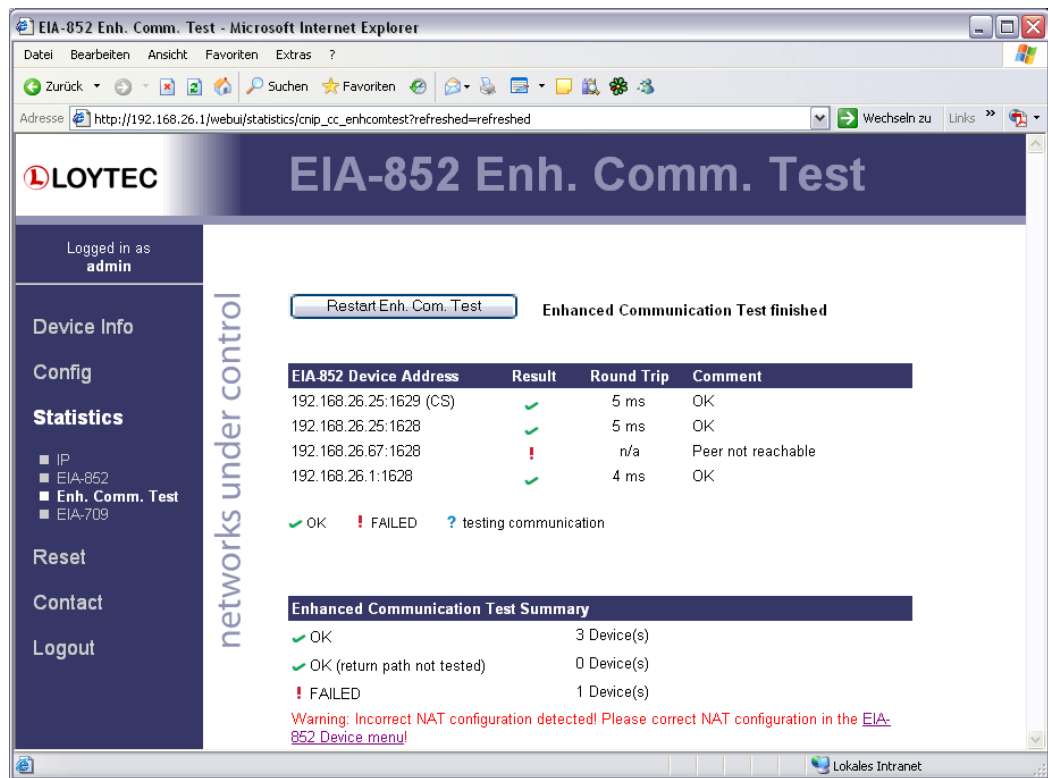


Figure 56: Enhanced Communication Test Output

The round-trip value (RTT) is measured as the time a packet sent to the peer device needs to be routed back to the L-Proxy. It is a measure for general network delay. If the test to a specific member fails, a text is displayed to describe the possible source of the problem. The reasons for failure are summarized in Table 6.

6.3.4 EIA-709 Statistics

The EIA-709 statistics page displays statistics data of the EIA-709 ports on the L-Proxy as shown in Figure 57. To select the statistics for a specific port, click on the tabs “Port 1”, “Port 2”, and “IP (node 1)” through “IP (node 3)”. This data can be used to troubleshoot networking problems. To update the data, click on the button “Update EIA-709 statistics”.

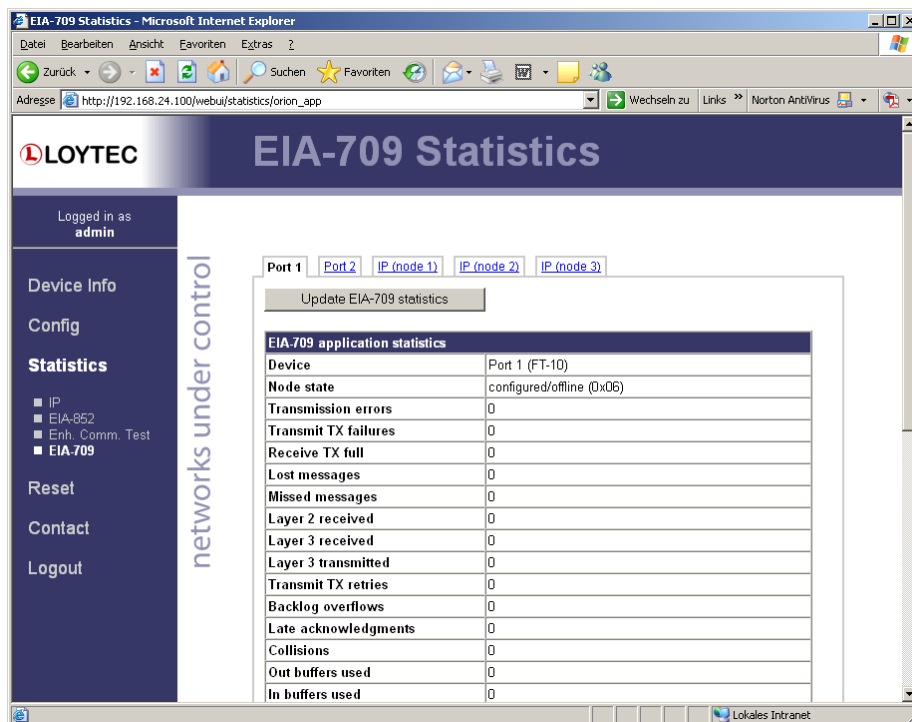


Figure 57: EIA-709 Statistics Page

6.4 Reset, Contact, Logout

The menu item “Reset” allows resetting the L-Proxy from a remote location. The “Contact” item provides contact information and a link to the latest user manual and the latest firmware version. The Logout item closes the current session.

7 Communication Media

7.1 FT

The L-Proxy FT ports are fully compatible to the parameters specified by LonMark for this channel. FT ports can also be used on Link Power (LP-10) channels. However, the L-Proxy does not provide the power supply for Link Power channels.

When using the Free Topology Segment feature of the FT, only one termination (Figure 58) is required and can be placed anywhere on the free topology segment. Instead of building the termination, one can order the L-Term module (LT-33) from LOYTEC, which can be used to properly terminate the bus.

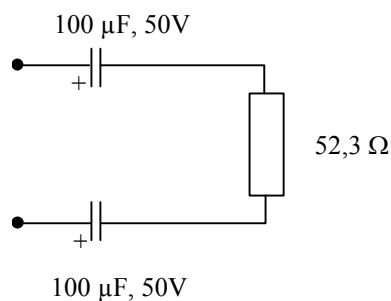


Figure 58: FT Free Topology Termination

In a double terminated bus topology, two terminations are required (Figure 59). These terminations need to be placed at each end of the bus. Here, also L-Term modules can be used at either end.

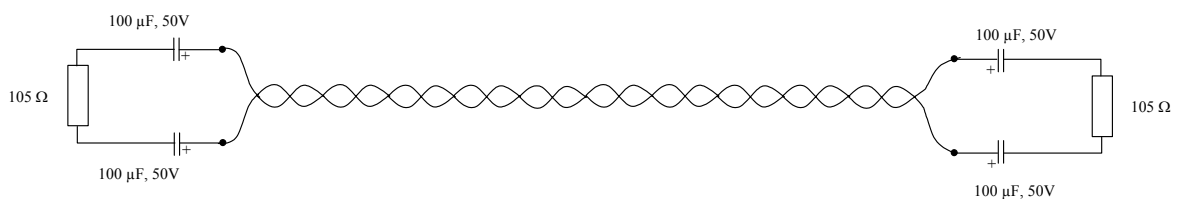


Figure 59: Termination in an FT Bus Topology

8 L-Gateway Configuration Software

8.1 Overview

The L-Gateway configuration software is used to configure the L-Proxy. It manages network variables (NVs) on each port, creates the internal connections between input and output NVs, and downloads/uploads the configuration to/from the L-Proxy. It is also used to specify configuration properties when NVs are polled rather than updated.

8.1.1 Data Points

The data points on the L-Proxy are its network variables (NVs) or parts of NVs (e.g., the value and state part of a SNVT_switch). The NVs on the L-Proxy are managed separately for each port. They can be created in three different ways:

- ◆ **Dynamic NV:** The user creates dynamic NVs in the network management tool on the L-Proxy. The configuration software uploads those dynamic NVs. Alternatively, the configuration software can create dynamic NVs from a list of scanned or imported NVs. Currently, only LNS-based tools can manage dynamic NVs. The dynamic NVs can be bound in the EIA-709 network.
- ◆ **Static NV:** The user defines a static NV on the L-Proxy. This can be done manually, or by selecting from a list of scanned or imported NVs. The static NV on the L-Proxy can be bound to the NV on the network. Note that adding static NVs to the L-Proxy results in a change to the default XIF file. The L-Proxy device of that port is assigned a new “model number” to reflect this change. Static NVs are the method in non-LNS systems, where NVs shall be bound instead of using polling.
- ◆ **External NV:** If neither dynamic nor static NVs shall be created on the L-Proxy, the user can define “external” NVs from a list of scanned or imported NVs. The L-Proxy sends updates to and uses polling to read values from external NVs. For polling external NVs, however, a pollcycle must be configured. If not configured explicitly a default pollcycle of 10 sec. is chosen. The default pollcycle can be changed in the project settings menu.

8.1.2 Connections

A connection in the L-Proxy specifies which data points exchange values with each other. The L-Proxy supports both “1:n” and “m:1” connections. The single data point is referred to as the “hub” data point, whereas the other data points are the “target” data points.

This means, the following connections are possible:

- ◆ 1 input is output to n outputs,
- ◆ m inputs are written to 1 output.

There exist a number of data point classes according to their stored type of information:

- ◆ User: This class is used to represent the complete SNVT of a structured SNVT type.
- ◆ Analog: This class is used for scalar values. This includes scalar SNVTs (e.g., SNVT_temp) or scalar parts of a SNVT (e.g. the value field of a SNVT_switch).
- ◆ Binary: This class is used for Boolean data types (e.g. a bit in the SNVT_state).
- ◆ Multi-state: This class is used for SNVT enumerations (e.g. SNVT_motor_state).
- ◆ String: This class is used for string members of a SNVT.

Connections can be created only from points within the same class of data points. This means connections can be created between

- ◆ any NVs (user points) of the same SNVT,
- ◆ any scalar points (analog points),
- ◆ any binary points,
- ◆ any multi-state points given they have the same number of states,
- ◆ and any string points.

8.1.3 Timing Configuration

Data points in the L-Gate configuration software can be configured with a number of timing parameters. The following properties are available to input or output data point respectively:

- ◆ Pollcycle (input): The value is given in seconds, which specifies that this data point periodically polls data from the source.
- ◆ Receive Timeout (input): This is a variation on the poll cycle. When receive timeout is enabled, the data point actively polls the source unless it receives an update. For example, if poll cycle is set to 10 seconds and an update is received every 5 seconds, no extra polls are sent.
- ◆ Poll-on-startup (input): If this flag is set, the data point polls the value from the source when the system starts up. Once the value has been read, no further polls are sent unless a poll cycle has been defined.
- ◆ Maximum Cache Age (output): This parameter defines, if a received poll request to an output can be answered from the data point cache. Setting it to '0' disables the cache. Then each poll request is repeated to the other side of the proxy. Setting it to '-1' sets the cache age to infinite and polls are never forwarded. A value in milliseconds defines that a poll is only forwarded, if the last update to the output is older than this setting.
- ◆ Minimum Send Time (output): This is the minimum time that elapses between two consecutive updates. If updates are requested more often, they are postponed and the last value is eventually transmitted after the minimum send time. Use this setting to limit the update rate.

- ◆ **Maximum Send Time (output):** This is the maximum time without sending an update. If no updates are requested, the last value is transmitted again after the maximum send time. Use this setting to enable a heart-beat feature.

8.2 Software Installation

The L-Gateway configuration software is used to configure the L-Proxy. It is installed as a plug-in tool for all LNS based network management tools, as well as a stand-alone configuration tool.

System requirements:

- ◆ LNS 3, Service Pack 8 or higher (for LNS mode)
- ◆ Network management tool that supports dynamic network variables (e.g. LonMaker 3.1 or higher, Newron NL-220, Spega Alex 3)
- ◆ Windows XP, Windows 2000, and Windows 2003 Server.

The configuration software can be downloaded from the LOYTEC website <http://www.loytec.com>. To install the configuration software, double click on Setup and follow the installation steps.

8.3 Registration as a Plug-In

8.3.1 Register in NL-220

After successfully installing the L-Proxy configuration utility the program must be registered as a plug-in in NL220. Open NL220 and create a new project. When the project is opened, make sure the option **Simple command string** is checked in the **PlugIns** menu. If not checked, check it by selecting the option. Then use the option **Register plugins** in the **PlugIns** menu. In the dialog as shown in Figure 60 select the **L-Gateway Configuration Plug-in** and click **OK**.

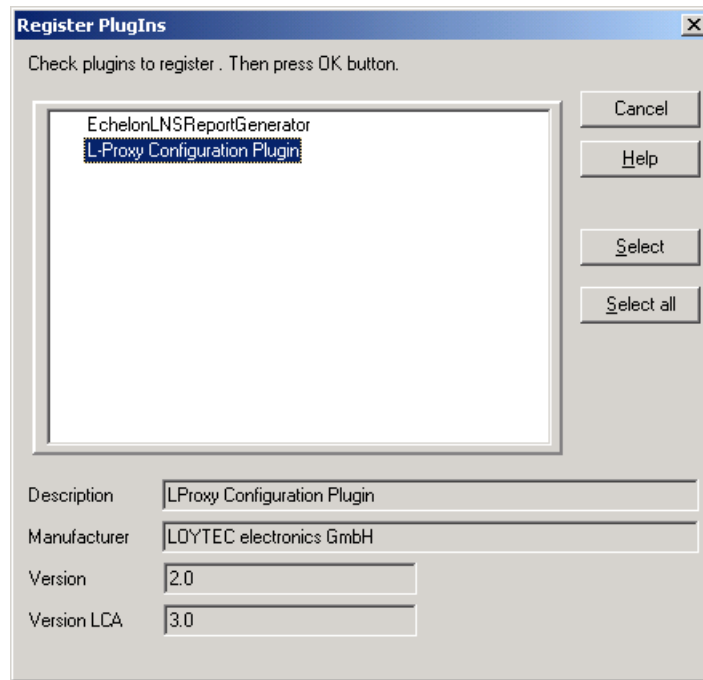


Figure 60: Select the Plug-in to be registered and click **OK**.

Note: If you are using multiple databases (projects) make sure you have registered the plug-in in each project.

Select again the option **Register plugins** in the **PlugIns** menu. Make sure the L-Proxy Configuration Plug-in is preceded by a ✓ sign as shown in Figure 61.

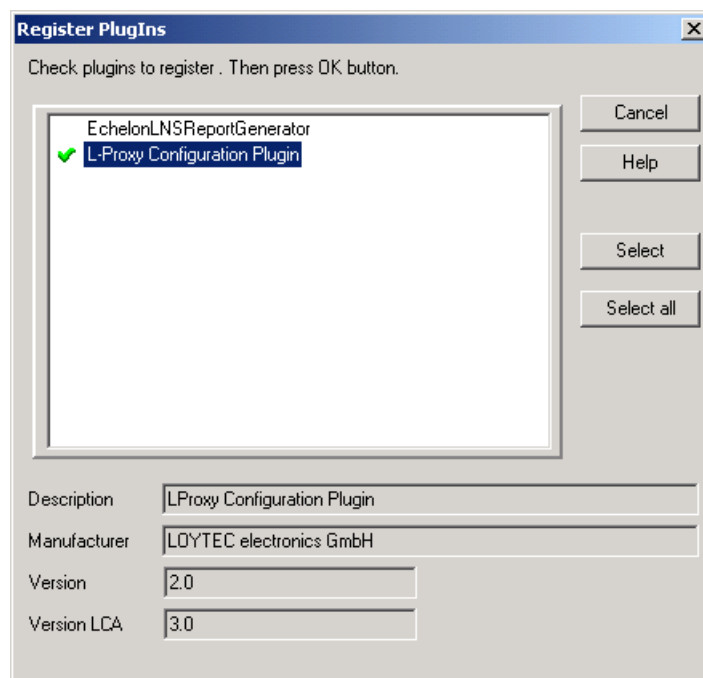


Figure 61: Double-check that the L-Proxy plug-in is properly registered.

8.3.2 Register in LonMaker

After successfully installing the L-Gateway configuration software the program must be registered as a plug-in in LonMaker. Open LonMaker and create a new network. When the Plug-in Registration Dialog window pops up, select the **L-Gateway Configuration Utility** from the list of “Not Registered Plug-Ins”. Device templates for the L-Proxy are added automatically and XIF files are copied into the LNS import directory.

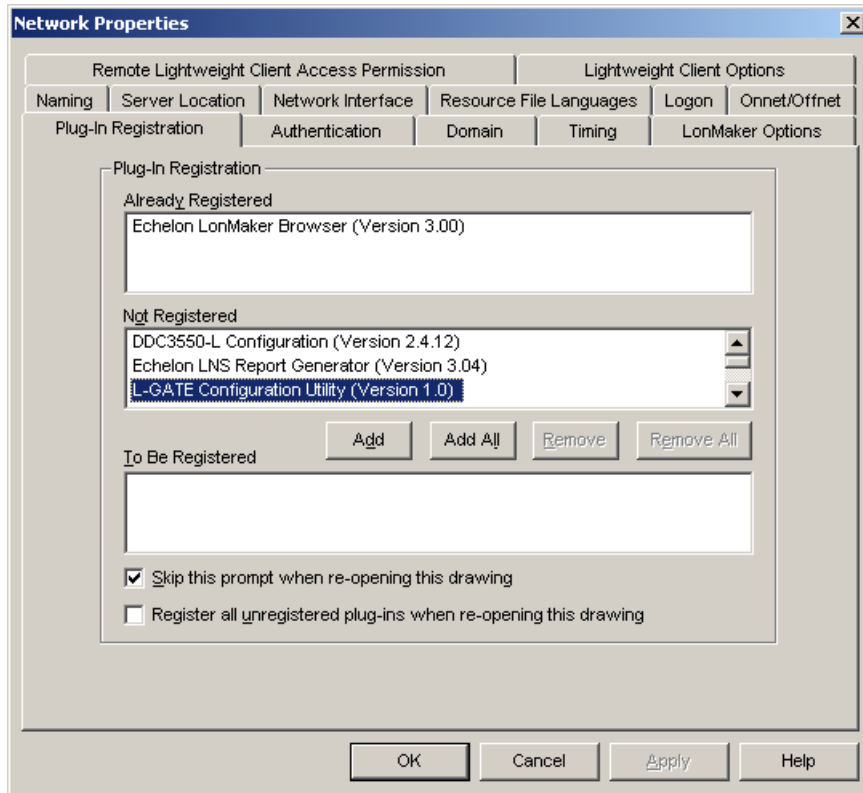


Figure 62: Select the Plug-in to be registered and click Add.

Note: If you are using multiple databases (projects) make sure you have registered the plug-in in each project.

In LonMaker → Network Properties → Plug-In Registration make sure that the **L-Gateway Configuration Utility** shows up under “Already Registered”.

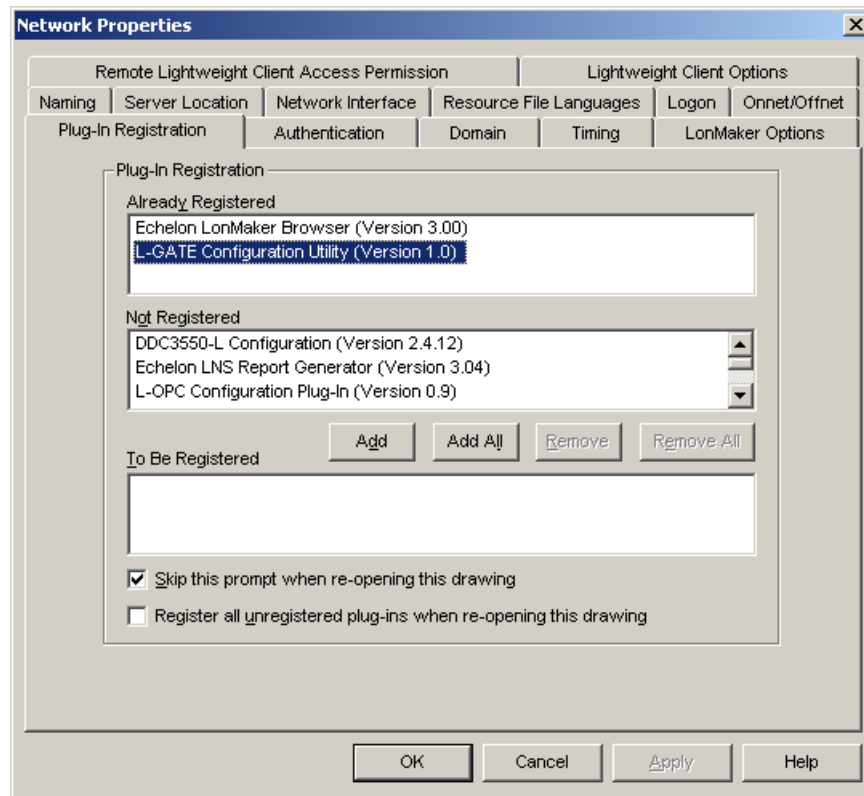


Figure 63: Double check that the L-Gateway plug-in is properly registered.

8.3.3 Register in Alex

After successfully installing the L-Proxy configuration software the program must be registered as a plug-in in Alex. Open Alex and create a new project or open the project to which an L-Proxy device should be added. In the tree view, right-click on the new project and select **Registriere PlugIn** and select **L-Gateway Configuration Plug-in** as shown in Figure 64. The registration process of the plug-in also generates the L-Proxy device templates automatically.

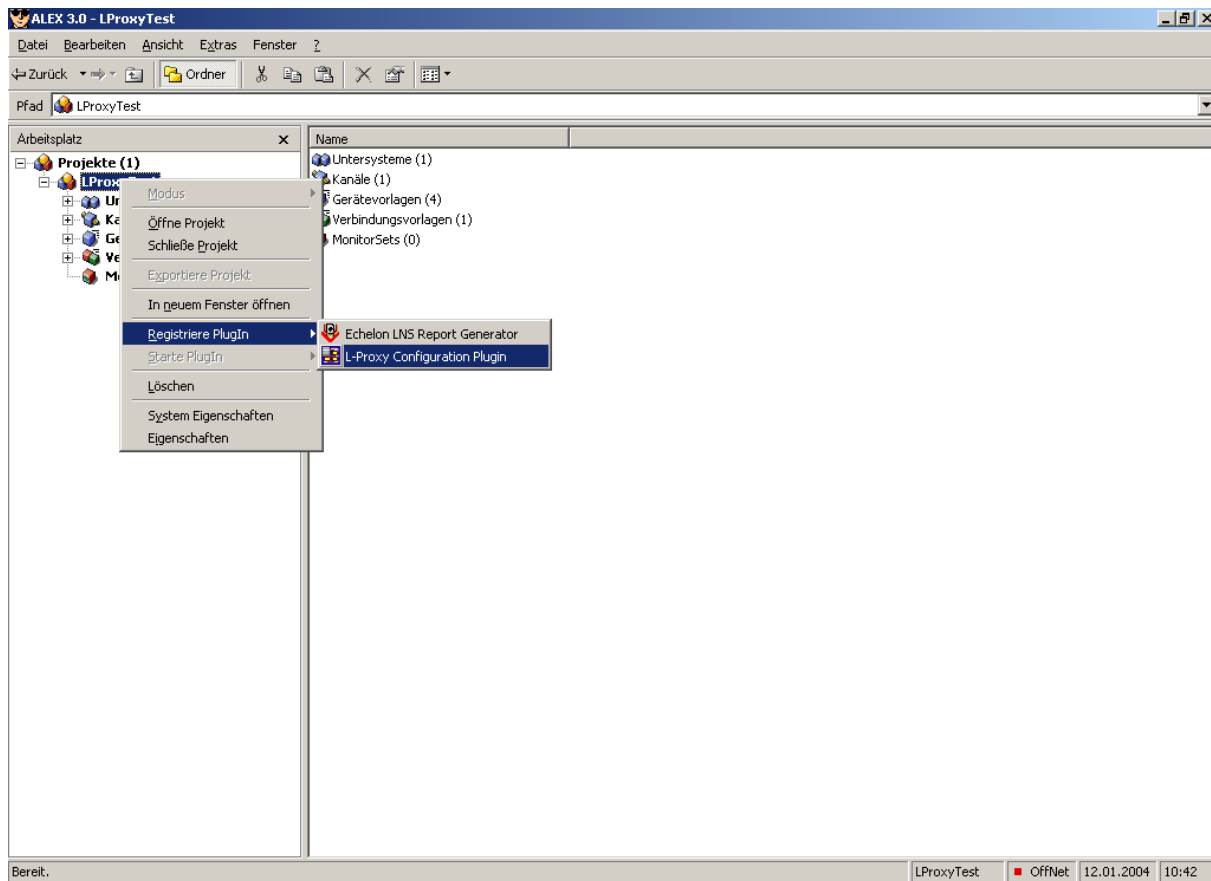


Figure 64: Register the L-Gateway Configuration Plug-in

Note: If you are using multiple databases (projects) make sure you have registered the plug-in in each project.

8.4 Operating Modes of the Configuration Software

The L-Gateway configuration utility can be used in on-line, off-line, and stand-alone mode. On-line and off-line mode refers to the 2 operating modes of your configuration tool.

8.4.1 On-line mode

This is the preferred method to use the configuration utility. The network management tool is attached to the network and all network changes are directly propagated into the network. This mode must be used to add the device, commission the device, extract the port interface definition, and to download the L-Proxy configuration into the device.

8.4.2 Off-line mode

The off-line mode the network management tool is not attached to the network or the L-Proxy is not attached to the network, respectively. This mode can be used to add the device using the device templates, create the port interface definition and to make the internal connections.

8.4.3 Stand-alone mode

The L-Gateway configuration software can also be executed as a standalone program. In this operating mode one can create the L-Proxy internal connections (see Section 9.7.9) but not all options to create the interface definition are available (see Section 9.7.3). This mode is very useful for the engineer who makes the time consuming connections between the data points of the different L-Proxy ports. For doing this, a network management tool (e.g., NL-220, LonMaker or Alex) is not needed.

8.5 Data Point Manager

The configuration software uses a central concept to manage data points. The “Datapoint Manager” dialog as shown in Figure 65 is used to select, create, edit and delete data points. The dialog is divided into three sections:

- ◆ The folder list (number 1 in Figure 65),
- ◆ The data point list (number 2 in Figure 65),
- ◆ And a property view (number 3 in Figure 65).

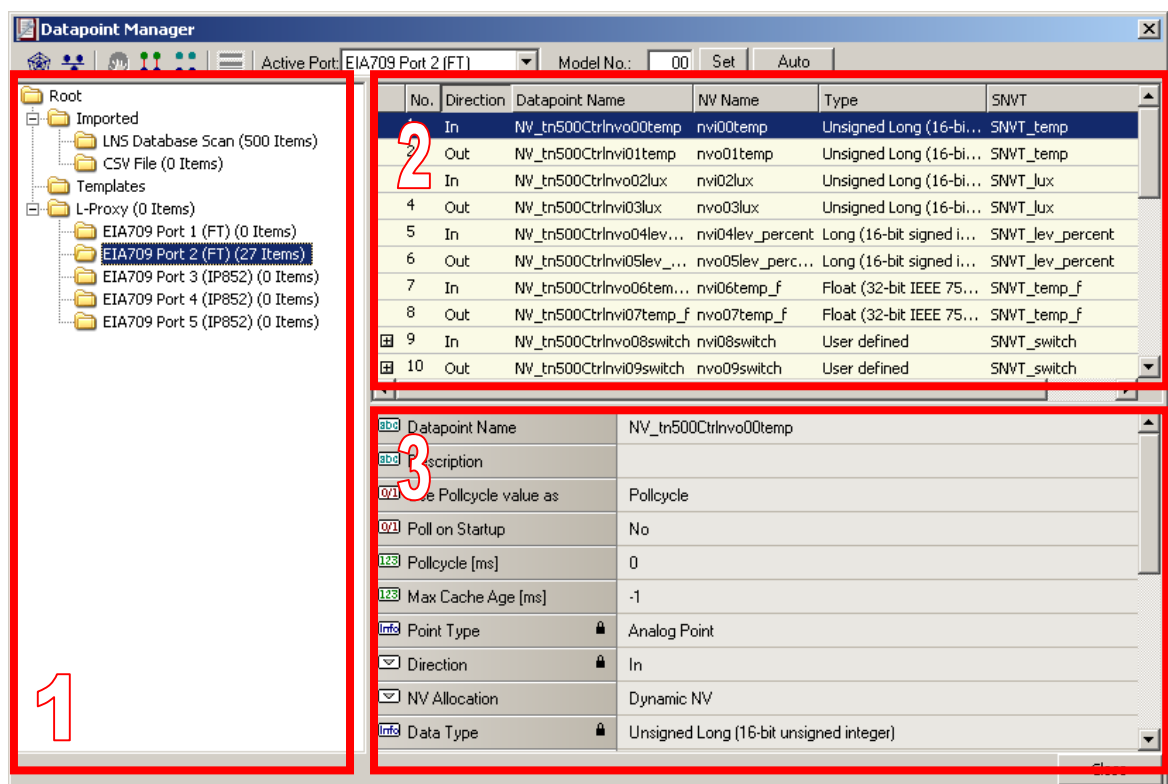


Figure 65: Datapoint Manager Dialog

8.5.1 Folder List

At the left is a list of folders which is used to sort the available data objects by their category. There are a number of predefined folders available:

- ◆ **Imported:** This folder has two sub-folders. One is used to hold data retrieved from a network scan, the other one is used to display data imported from CSV files. Data objects in the import folder are not stored on the device when the project is downloaded. They represent data objects which are available on remote devices and are shown here as templates to create suitable data objects for use on the device by selecting the “Use on Device” option.
- ◆ **Templates:** This folder contains the created data point templates. They contain a set of properties, which are applied to data points, when they are created on the L-Proxy.
- ◆ **L-Proxy:** For each port of the L-Proxy a separate sub-folder is shown. Each of the port sub-folders contains all the necessary data points which constitute to the port interface definition. These data points are created on the L-Proxy when the configuration is downloaded.

8.5.2 Data Point List

At the top right, a list of all data objects which are available in the selected folder is shown. From this list, objects may be selected (including multi-select) in order to modify some of their properties. A double-click will select the data point, if the dialog is opened for selecting data points.

The list can be sorted by clicking on one of the column headers. For example, clicking on the “Direction” column header will sort the list by direction. Other columns display data point name, NV name, and SNVT.

New objects may be created in the selected folder by pressing the New button to the right of the list or via the New command in the context menu. The list may be sorted by a click on the desired list column. A  sign in the list indicates that the data point contains sub-points. These can be structure members for structured SNVTs. Clicking on the  expands the view.

8.5.3 Property View

When one or multiple data points are selected, the available properties are displayed in the property view. Properties, which are read-only are marked with a lock  sign. In a multi-select only those properties common to all selected data points are displayed. Depending on the network technology and data point class, different properties may exist.

Some important properties include:

- ◆ **Datapoint Name:** This is the technology-independent data point name. This name may be used for the actual network variable, but can be different (e.g. longer). Datapoint names must be unique within a given folder.
- ◆ **Description:** This is a human readable description of the data point. There are no special restrictions for a description.
- ◆ **NV Allocation:** This property defines, how a data point shall be allocated on the device. Choices are “Static NV”, “Dynamic NV”, and “External NV”. If the allocation type cannot be changed, this property is locked.

9 L-Proxy in a Network

This Chapter gives step-by-step instructions on how to commission L-Proxy, create multiple *Proxy* functional blocks, create input and output network variables, and create the internal connections. We show the configuration steps using NL-220, LonMaker 3.1, and Alex 3 but other LNS-based network management tools can be used as well to install and configure L-Proxy.

9.1 Network Interfaces

The L-Proxy as a physical device has 5 network ports. Port 1 and port 2 are FT-10 ports, port 3 through 5 are IP-852 ports. The FT-10 ports are physically available on terminals 1 through 6 (see Section 4.8) and can be connected to two separate FT-10 channels.

In the LNS database each L-Proxy port corresponds to a single device in the LNS database. These devices can be part of the same database (same domain) or live in different databases (different domains). Figure 66 shows an example where all five ports of one physical L-Proxy are represented as separate devices in the same LNS database.

The three IP-852 ports deserve more explanation. They are logical ports on the physical Ethernet interface of the L-Proxy and connect to a single IP-852 channel. This means, that the L-Proxy is added as a single EIA-852 device to the configuration server (see Section 6.2.4). In the LNS database they are treated as three separate devices, with three different Node IDs. This means, that each of the IP-852 ports has to be added to an LNS database separately. Figure 66 depicts this situation for Port 3 to 5.

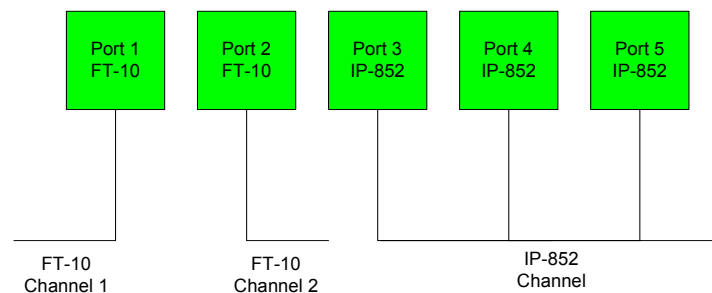


Figure 66: FT-10 and IP-852 ports on the L-Proxy

The IP-852 ports connected to the IP-852 backbone channel can be converted to more FT-10 channels in combination with EIA-852 routers such as the L-IP. Figure 67 shows a network diagram to illustrate this concept. Domains 2, 3, and 4 are attached via L-IPs to the L-Proxy's IP-852 ports.

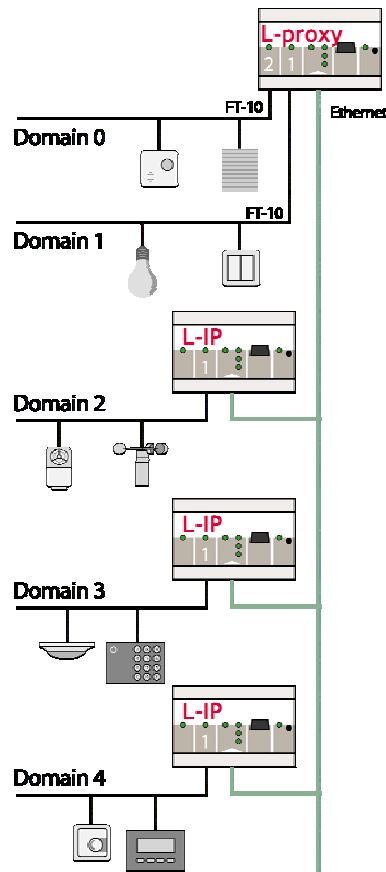


Figure 67: Connecting the IP-852 ports to other channels using L-IPs.

9.2 Work Flows for the L-Proxy

This section presents a number of work flows for the L-Proxy in different use cases in addition to the simple use case in the quick-start scenario (Section 3.3). The description is intended to be high-level and is depicted in a flow diagram. The individual steps refer to later Sections, which describe each step in more detail. In principle, the L-Gateway configuration software supports the following use cases:

- ◆ Network Management Tool based on LNS 3.x with dynamic NVs (see Section 9.2.2)
- ◆ Network Management Tool based on LNS 3.x with static NV interface (see Section 9.2.3)
- ◆ Tool not based on LNS 3.x (see Section 9.2.4)

9.2.1 Involved Configuration Files

In the configuration process, there are a number of files involved:

- ◆ Port interface definition file: This type of file contains all data points and their settings for one port of the L-Proxy. This file is exported from and imported into the L-Gateway configuration software to exchange port interface definitions between the integrators. These files end with “.itf”.

- ◆ XIF file: This is the standard file format to exchange the static interface of a device. This file can be used to create a device in the database without having the L-Proxy on-line.
- ◆ Configuration project file: This file contains all ports, all data points and all connections of a project. These files end with “.gtw”. Alternatively to exchanging the port interface definition files, the integrators can also pass on the project file. In this case, however, integrators can only work incremental. As an advantage, the internal connections can already be created partly during the process instead of creating all connections in the end.

9.2.2 Configure with LNS and Dynamic NVs

The flow diagram in Figure 68 shows the steps that need to be followed in order to install L-Proxy in a network with LNS 3.x and using dynamic NVs. First, a device of an L-Proxy port must be added to LNS (see Section 9.3). Then one or more functional block must be created (see Section 9.4). In those functional blocks the input and output network variables must be created dynamically (see Section 9.5). Then the binding with the other nodes in the network can be created. After all network variables have been created one must start the L-Proxy configuration software, and export the port interface definition for the installed L-Proxy port (see Section 9.7.6).

Close the L-Gateway configuration software and repeat this procedure for all other L-Proxy ports. Note, that the other L-Proxy ports may be added to different LNS databases (different domains) by different engineers. If the ports are used in different LNS databases you need to open the different LNS databases and extract the port interface definitions for the L-Proxy port in those LNS databases. If multiple engineers are working on a project they need to designate one engineer, who is responsible for creating the internal connections. In the end, a set of port definition files must be available to that engineer.

After all ports have been configured the engineer who is responsible for creating the internal connections opens the L-Gateway configuration software on one of his L-Proxy ports. Then he must import the port interface definition files for all L-Proxy ports (see Section 9.7.8). When the interface configurations have been loaded the connections can be created (see Section 9.7.9).

After the connections have been created, one of the L-Proxy ports has to be designated as the “download port”. This is the port over which the configuration is downloaded. Before downloading the new L-Proxy configuration into L-Proxy, at least the download port must be commissioned. When the device corresponding to the download port of the L-Proxy is online the new configuration can now be downloaded using the configuration software (see Section 9.7.13). It is recommended to save the complete configuration to a disk file for being able to replace an L-Proxy in the network.

To add more NVs when all bindings are in place and the L-Proxy is being used, please refer to Section 9.2.5 on how to extend an existing configuration with LNS.

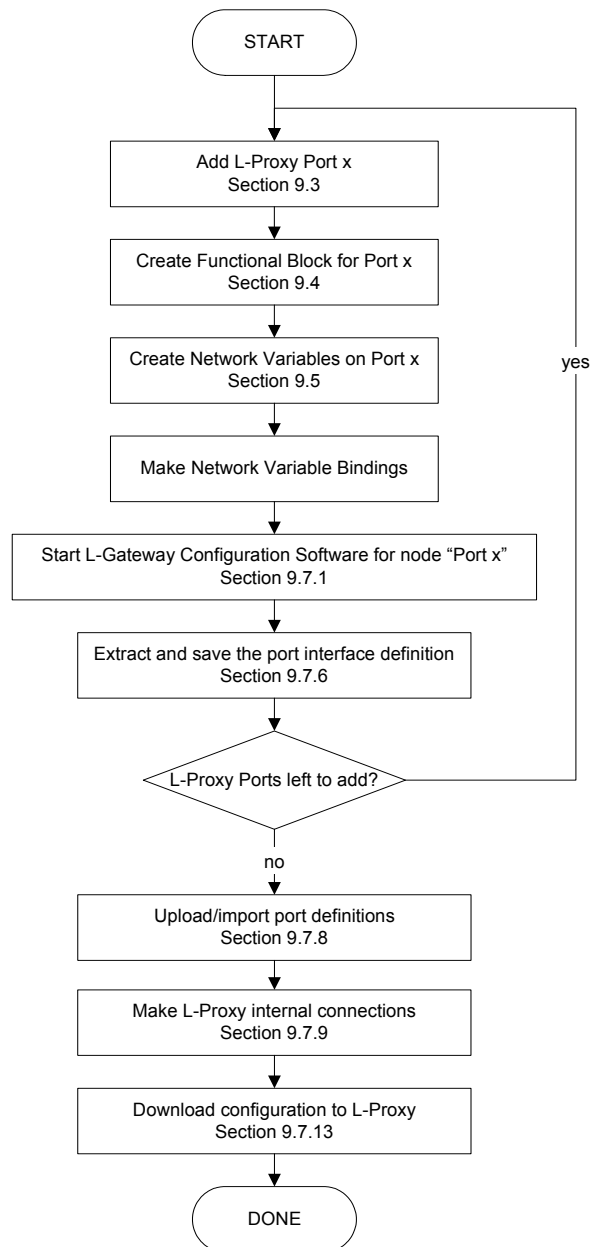


Figure 68: Basic design-flow with LNS and dynamic NVs.

9.2.3 Configure with LNS and static NVs

Configuration of the L-Proxy with static NVs in LNS can be beneficial if a basic configuration shall be pre-configured as a static interface. Later additions to the network variables can be done with dynamic NVs at run-time. Figure 69 depicts the basic work flow.

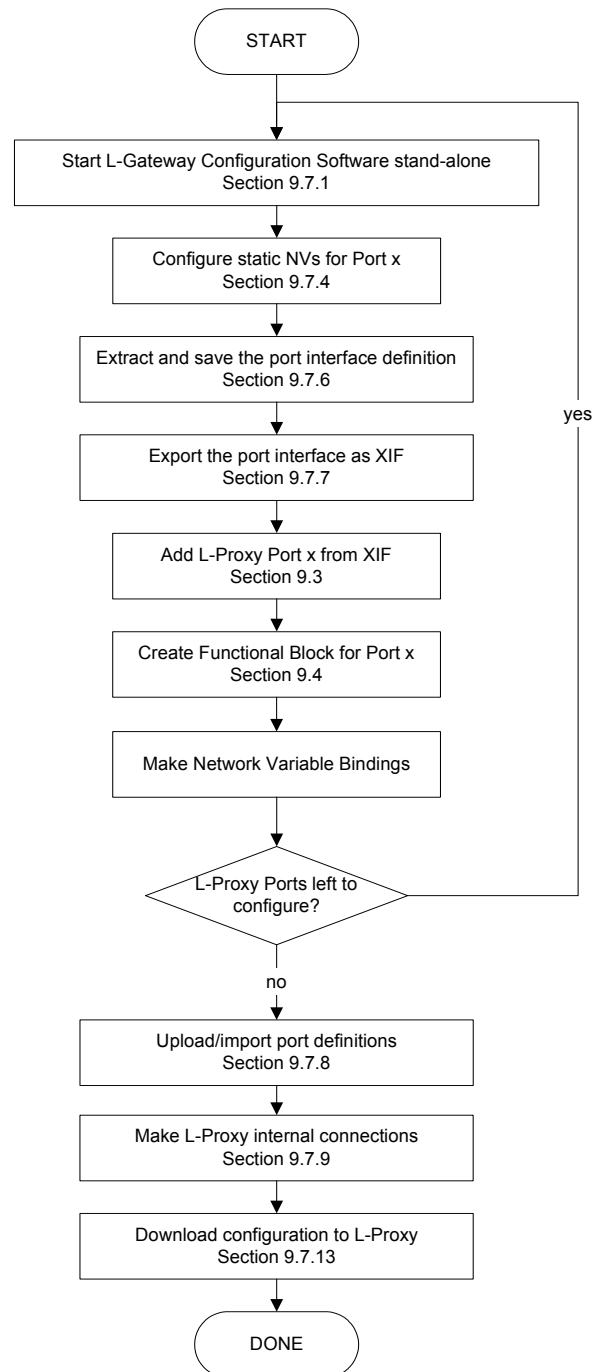


Figure 69: Basic design-flow with LNS and static NVs.

The L-Gateway configuration software needs to be started in stand-alone mode (see Section 9.7.2). Then the user needs to configure the static NVs for the desired L-Proxy port (see Section 9.7.4). After all static network variables have been created, the port definition for the L-Proxy port needs to be exported (see Section 9.7.6). In addition, the static network variable interface of this L-Proxy port must be exported as a XIF file (see Section 9.7.7). Now an L-Proxy device can be added from this XIF file in the LNS database (see Section 9.3). Then one or more functional blocks must be created, which contain the static NVs (see Section 9.4). Having the static NVs visible, the bindings with the other nodes in the network can be created.

Close the L-Gateway configuration software and repeat this procedure for all other L-Proxy ports. Note, that the other L-Proxy ports may be added to different LNS databases (different domains) by different engineers. If the ports are used in different LNS databases you need to open the different LNS databases and extract the port interface definitions for the L-Proxy port in those LNS databases. If multiple engineers are working on a project they need to designate one engineer, who is responsible for creating the internal connections. In the end, a set of port definition files must be available to that engineer.

After all ports have been configured the engineer who is responsible for creating the internal connections opens the L-Gateway configuration software on one of his L-Proxy ports. Then he must load the port interface definition files (see Section 9.7.6). When the interface configurations have been loaded the connections can be created (see Section 9.7.9).

After the connections have been created, download the configuration when the L-Proxy is connected to the network using the configuration software (see Section 9.7.13). It is recommended to save the complete configuration to a disk file for being able to replace an L-Proxy in the network.

Note, that once the static NV interface is complete and all bindings are in place it is not recommended to change that interface. To add NVs to such a configuration it is recommended using dynamic NVs. Please refer to Section 9.2.5 on how to extend an existing configuration with LNS.

9.2.4 Configure without LNS using Static NVs

Without LNS the L-Proxy can be configured using static NVs. This is beneficial, if network variables shall use bindings, but the installer uses a network management tool, which is not based on LNS 3.x. The basic work flow is depicted in Figure 70.

The L-Gateway configuration software needs to be started in stand-alone mode (see Section 9.7.2). Then the user needs to configure the static NVs for the desired L-Proxy port (see Section 9.7.4). After all static NVs have been configured, the port interface definition file for the L-Proxy port needs to be exported (see Section 9.7.6). Then also export the static NV interface as a XIF file (see Section 9.7.7).

The XIF file has to be used in the non-LNS tool to create a device for the L-Proxy. Using that device, the integrator can create the bindings in that tool. Please refer to the documentation of the network management tool on how to create devices from a XIF file and bind network variables.

Close the L-Gateway configuration software and repeat this procedure for all other L-Proxy ports. Note, that the other L-Proxy ports may be added to different domains by different engineers. If multiple engineers are working on a project they need to designate one engineer, who is responsible for creating the internal connections. In the end, a set of port definition files must be available to that engineer.

After all ports have been configured the engineer who is responsible for creating the internal connections opens the L-Gateway configuration software stand-alone. Then he must load the port interface definition files (see Section 9.7.6). When the interface configurations have been loaded the connections can be created (see Section 9.7.9).

After the connections have been created, the complete configuration can be saved. Before downloading the new L-Proxy configuration, the user must connect the configuration software to the L-Proxy via the FTP connection button (see Section 9.7.2). After the configuration has been downloaded to the L-Proxy the integrators need to commission the L-Proxy devices in their network management tools. It is recommended to save the complete configuration to a disk file for being able to replace an L-Proxy in the network.

Note, that once the static NV interface is complete and all bindings are in place it is not recommended to change that interface. Since the XIF files change the device may have to be deleted in the respective network management tool and created again from the new XIF file. This means also that all existing bindings may be lost and have to be recreated. To add NVs to an existing configuration it is recommended using external NVs. Please refer to Section 9.2.6 on how to extend an existing configuration without LNS.

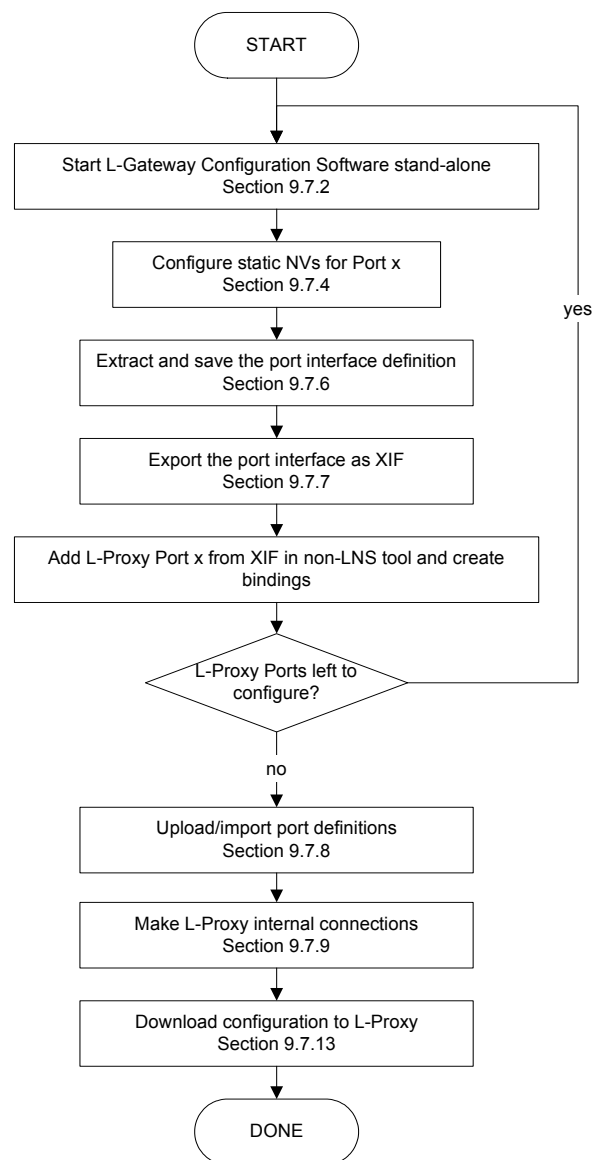


Figure 70: Basic design-flow without LNS using static NVs.

9.2.5 Change an Existing Configuration with LNS

The recommended way to change an existing (probably static) port interface is to add/delete dynamic network variables. Dynamic network variables in the Proxy functional block or the virtual interface can be added and deleted without losing an existing binding in NL-220, LonMaker, or Alex. The L-Gateway configuration software synchronizes with the added or deleted network variables. The work flow to change an existing configuration for a specific port is shown in Figure 71.

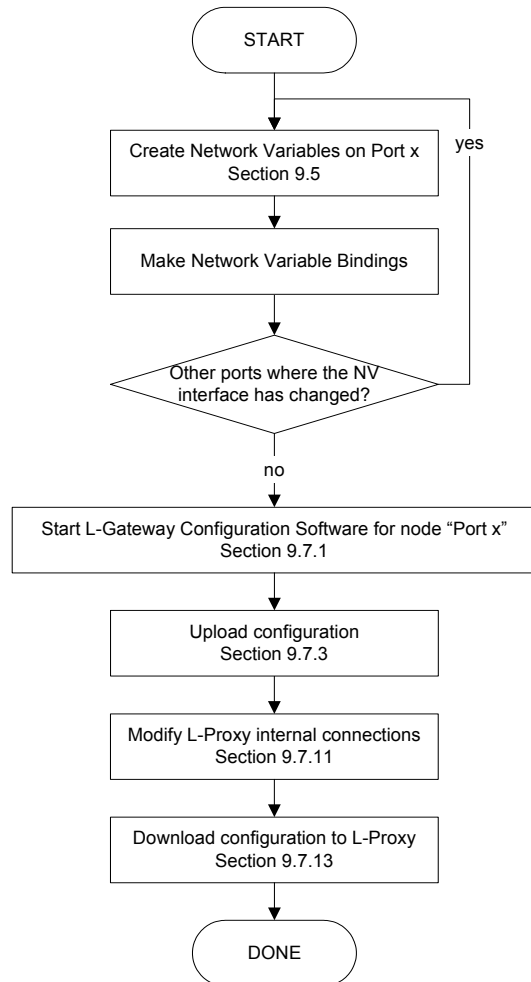


Figure 71: Work flow to modify an L-Proxy interface with LNS.

To change the network variable interface of Port x open the LNS network management tool and create, delete or modify the dynamic input and output network variables (see Section 9.5). Then create the bindings for the updated dynamic NVs with the other nodes in the network. This can be done independently by separate engineers in parallel.

At the end of all changes one engineer is designated to modify the internal connections in the L-Proxy to adapt to the updated NV interface. This engineer starts the L-Gateway configuration software as a plug-in on his designated "download port" (see Section 9.7.1) and uploads the current configuration (see Section 9.7.3). This upload also synchronizes the updated dynamic network variables. Then the connections can be modified (see Section

9.7.11). Finally, the updated configuration needs to be downloaded into the L-Proxy again (see Section 9.7.13).

9.2.6 Change an existing Configuration without LNS

The recommended way to change an existing static port interface in systems without LNS is to add/delete external network variables. These network variables use polling to read data from the network and send explicit updates to write data to the network. Since the existing static NV interface is not changed by external NVs, no bindings are lost. Figure 72 shows the corresponding work flow.

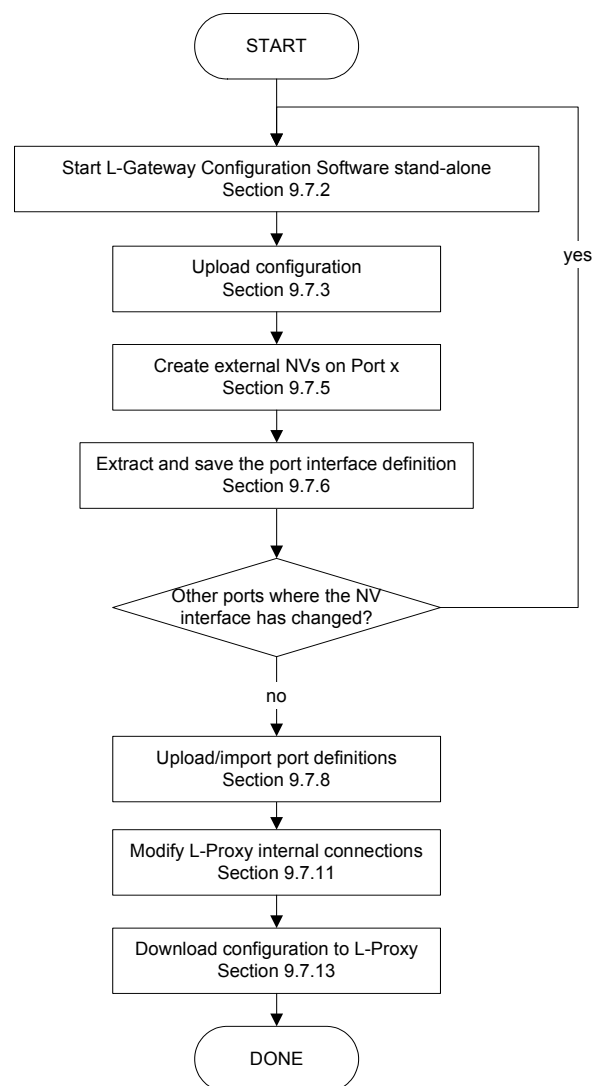


Figure 72: Work flow to modify an L-Proxy interface without LNS.

To change the network variable interface of Port x open the L-Gateway configuration software stand-alone and connect to the L-Proxy using the FTP method (see Section 9.7.2) and upload the current configuration from the L-Proxy (see Section 9.7.3). Then create, delete or modify the external input and output network variables (see Section 9.7.5). Note, that there is no need to create bindings for external NVs. Finally, export the updated port interface

definition for Port x (see Section 9.7.6). These steps can be done independently by separate engineers in parallel.

At the end of all changes one engineer is designated to modify the internal connections in the L-Proxy to adapt to the updated NV interface. This engineer starts the L-Gateway configuration software stand-alone and connects to the L-Proxy via the FTP method (see Section 9.7.2). Then he uploads the current configuration (see Section 9.7.6) and imports the updated port interface definitions (see Section 9.7.6). Then the connections can be modified (see Section 9.7.11). Finally, the updated configuration needs to be downloaded into the L-Proxy again (see Section 9.7.13).

9.2.7 Replace an L-Proxy

An L-Proxy can be replaced in the network by another unit. This might be necessary, if a hardware defect occurs. First of all, the replacement L-Proxy needs to be configured with the appropriate IP settings, including all relevant EIA-852 device settings. The remainder of this section focuses on the L-Proxy port interface configuration and internal connection configuration. The work flow is depicted in Figure 73.

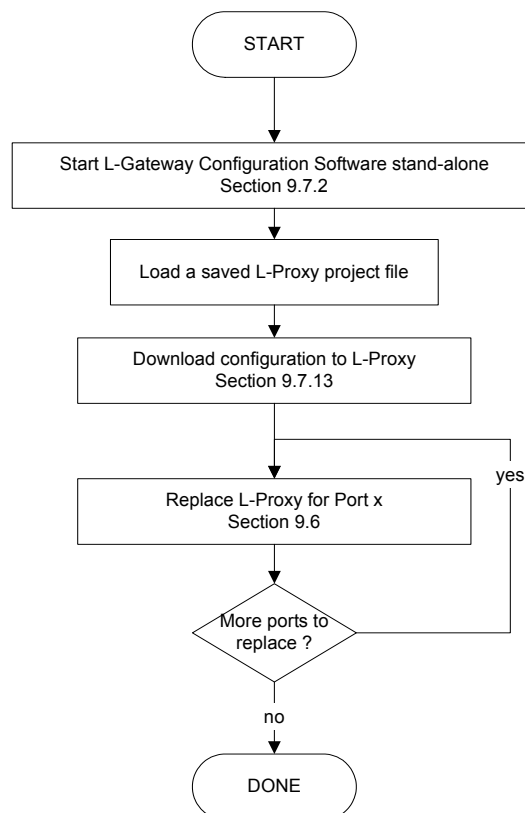


Figure 73: Basic work flow to configure a replacement device.

Start the L-Gateway configuration software stand-alone and connect via the FTP method (see Section 9.7.2). Then load the L-Proxy configuration project file from disk, which has been saved when the original L-Proxy has been configured or modified. Double-check, if all connections and port configurations are sensible. Then download the configuration to the L-Proxy (see Section 9.7.13).

For each L-Proxy port open the network management tool. If using an LNS-based tool, the L-Proxy device needs to be replaced (see Section 9.6). If you are not using LNS, then refer to your network management tool's reference manual on how to replace a device. The replacement step needs to be repeated for each port of the L-Proxy.

9.3 Adding L-Proxy

This Section shows the basic steps that need to be followed in order to add the L-Proxy in a network management tool. Before you continue please make sure that you have installed the L-Gateway configuration software as explained in Chapter 8.

When the L-Proxy port is not configured with a static NV interface, adding the L-Proxy uses the standard XIF files that are installed by the L-Gateway configuration software: 'L-Proxy_V3_0_FT-10.xif' for an FT port, and 'L-Proxy_V3_0_IP-10L.xif' for an IP-852 port. If the L-Proxy port is configured with a static NV interface, use the XIF file, which has been exported for that port (see Section 9.7.7).

9.3.1 Adding L-Proxy in NL-220

Make sure you are in the **All subsystems** tree. For this, the button  in **Trees toolbar** must be pressed (if not click on it).

Right click on the subsystem you want to add the device in and select the option **New node in <...>**

In the dialog from Figure 74 specify a device name for the new device e.g. *L-Proxy Port 2* in case you have multiple L-Proxies in the network.

Check the option **Create node from a device template**.

Select the proper device template for the L-Proxy Port. An FT port (Port 1, 2) uses the "L-Proxy V3_0 FT10" template and the IP-852 port (Port 3, 4, 5) the "L-Proxy V3_0 IP10-L" template.

Click *OK*

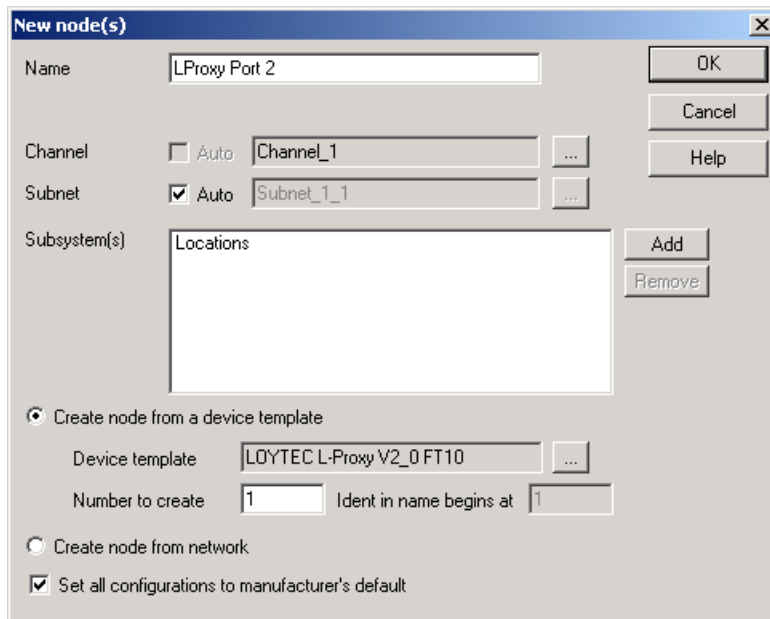


Figure 74 Adding a new L-Proxy port (Port 2) to the network.

Note: You may select the channel manually by un-checking **Auto** and clicking on . You will be able to select the channel you want to create the device in. If **Auto** is checked then **NL220** will try to automatically determine the channel of the device from the network.

Your L-Proxy node should now appear in the NL220 tree as shown in Figure 75. Its icon must be .

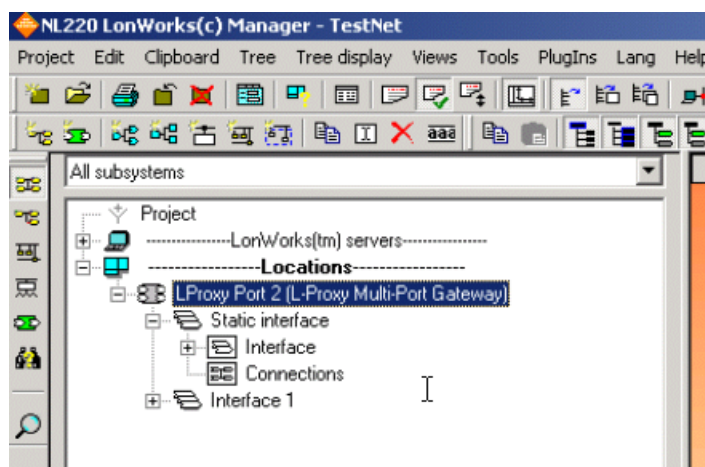


Figure 75: L-Proxy Interface.

9.3.2 Adding L-Proxy in LonMaker

Drag a new device shape onto the drawing area. In the dialog from Figure 76 specify a device name for the new device e.g. *L-Proxy1 Port 2* in case you have multiple L-Proxies in the network. Select *Commission Device*, then click *Next*.

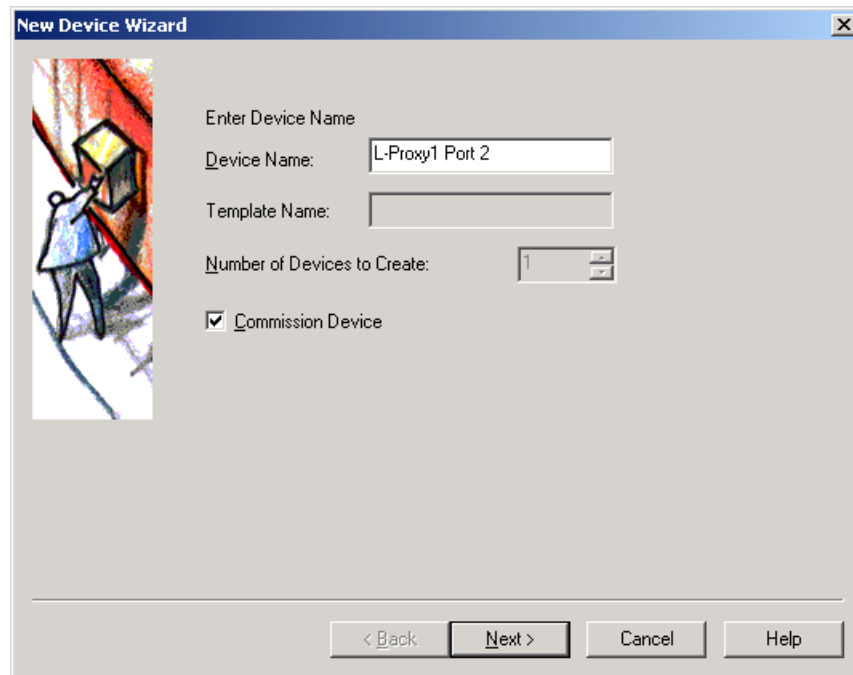


Figure 76: Adding a new L-Proxy port (Port 2) to the network.

In the next dialog window select *Existing Template* and select the proper template name as shown in Figure 77. Please use the template “L-Proxy V3_0 FT10” for an FT10 port and “L-Proxy V3_0 IP10-L” for the IP-852 port.

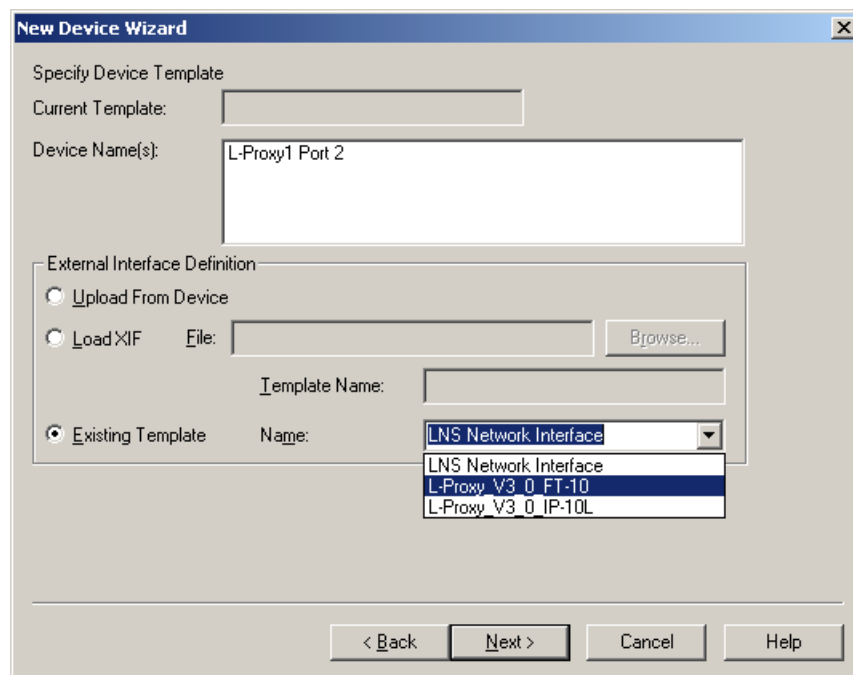


Figure 77: Specify the following Template Names.

Click *Next*. Select the channel to which *L-Proxy1 Port 2* should be connected (see Figure 78).

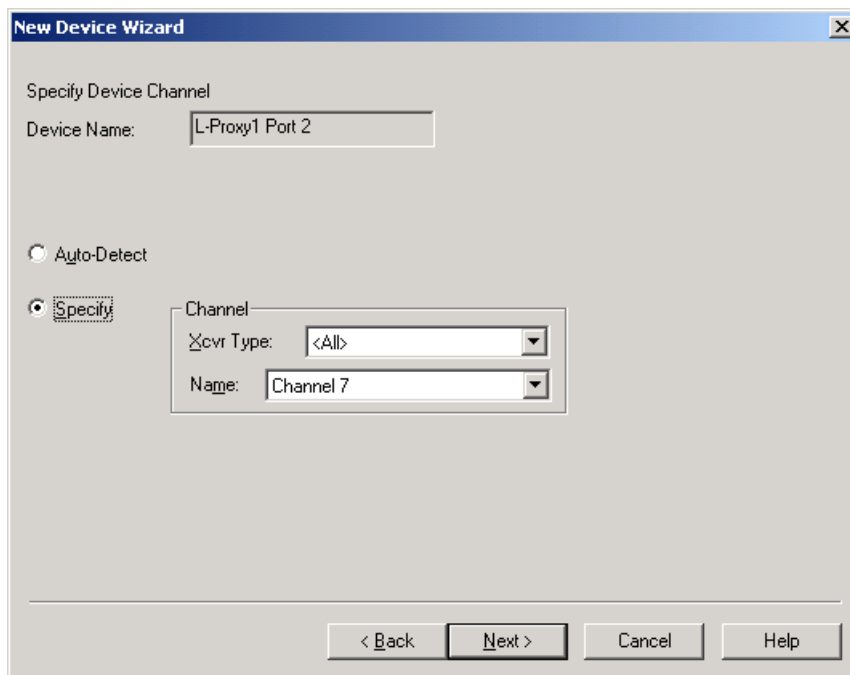


Figure 78: Select the proper channel for L-Proxy Port 2.

Click *Next*. Then Click *Next* again. The dialog shown in Figure 79 appears.

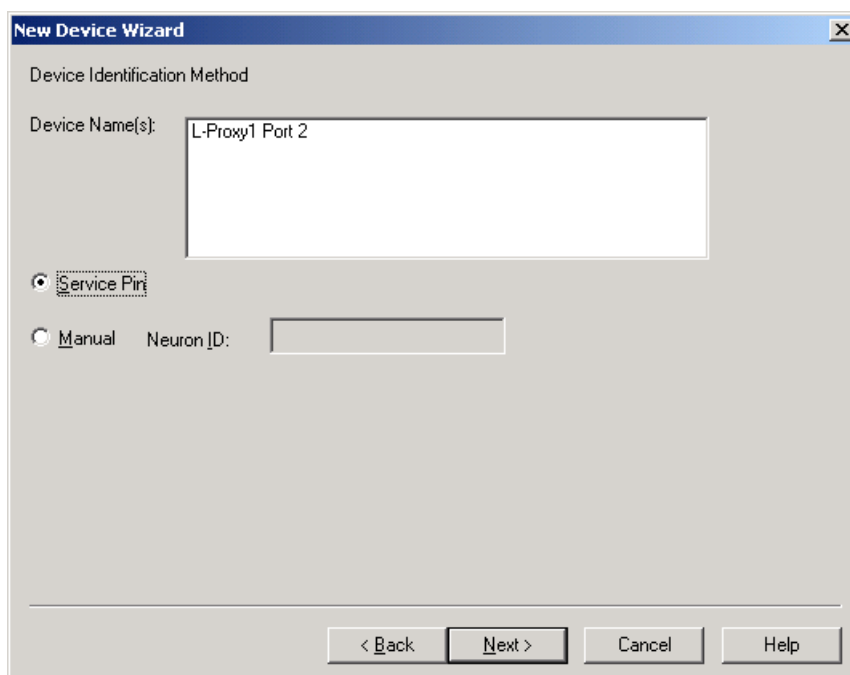


Figure 79: Select Service Pin or Manual. The Neuron ID of the 5 ports are printed on a label that comes with L-Proxy.

Click *Next*. Then click *Next* again. Then the dialog shown in Figure 80 appears. Choose online state.

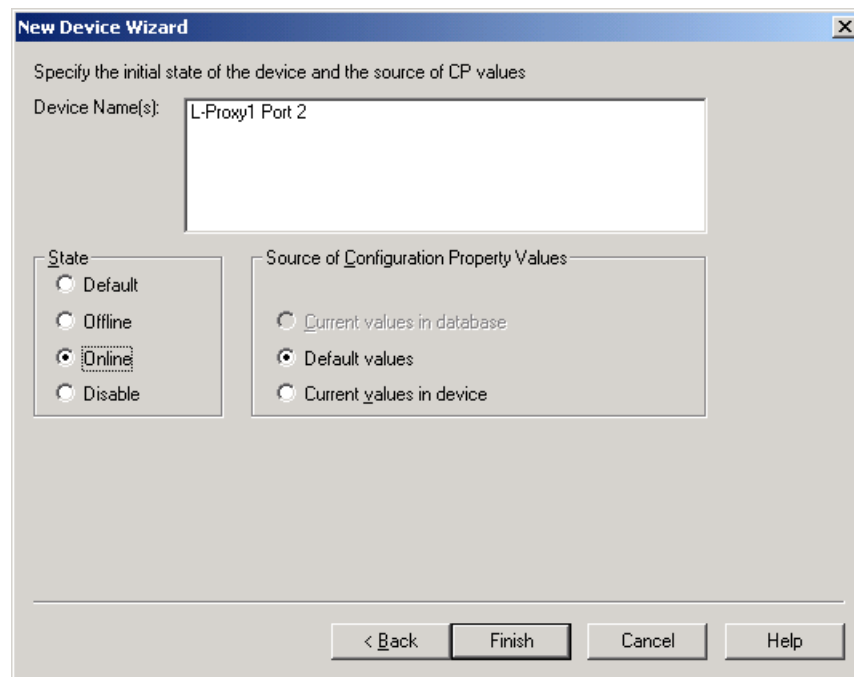


Figure 80: Choose State: Online

Click *Finish*. Then the requestor shown in Figure 81 appears. In order to use the Service Pin on L-Proxy one must press and hold the status button until the port LED for the desired port lights up yellow. Release the button and L-Proxy sends out the service pin message for this port.

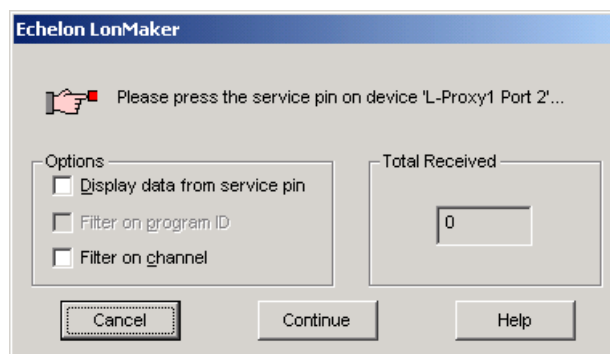


Figure 81: Service pin requestor dialog.

In some installations the message in Figure 82 might appear. Click “Yes, set the defaults” to complete the process.

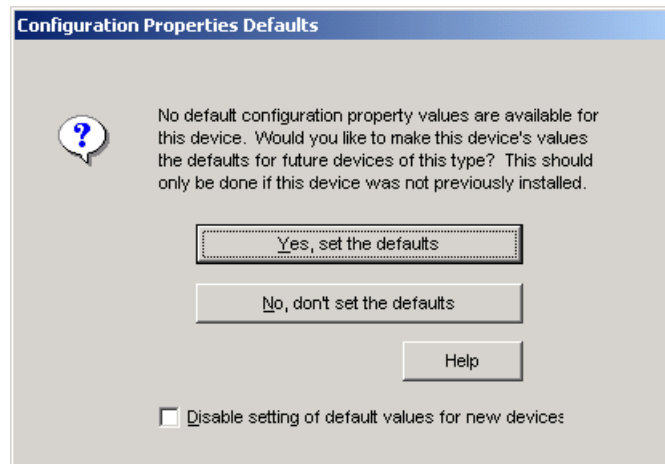


Figure 82: Click on Yes to continue.

Your L-Proxy node should now appear in the LonMaker drawing area.

9.3.3 Adding L-Proxy in Alex

In the tree view, go to the subsystem to which the L-Proxy port should be added. Select *Geräte* and choose *Neues Gerät*. The Dialog in Figure 74 is shown. Enter the device name (e.g. L-Proxy Port 1) and choose the correct device template for the L-Proxy. Make sure to select the device template according to the L-Proxy port you are adding (FT10 version for port 1, 2, and the IP10-L version for ports 3, 4, 5). If required, enter the Neuron ID or press the Service Pin and select *OK* to close the dialog and add the L-Proxy port to the project.



Figure 83: Adding a new L-Proxy port (Port 1) to the network.

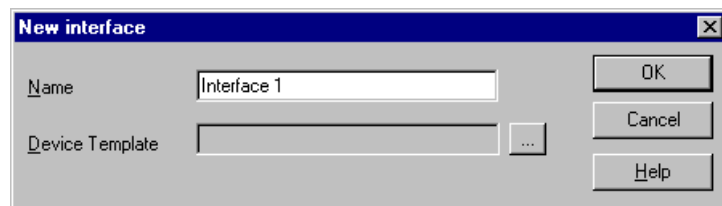
9.4 Creating Functional Blocks/Virtual Interfaces

After adding the L-Proxy node at least one but up to five functional block/virtual interfaces must be created for the proxy object, if dynamic NVs are going to be used.

9.4.1 Creating Virtual Interfaces in NL-220

After adding the L-Proxy node a virtual interface must be created for the device. Right click on the device and select the option **New interface ...** in the **Virtual interfaces** sub menu.

In the next window enter the name of the interface, for example **Interface 1**. You may create as many interfaces as needed (for example to sort network variables by functions).



Click *OK*

The virtual interface must now appear in the L-Proxy device in the tree (see Figure 84). Open the **L-Proxy1 Port2** device in the tree (click on the ⊕). You must be able to see a Static interface (containing static network variables) and the virtual interface you created **Interface 1**.

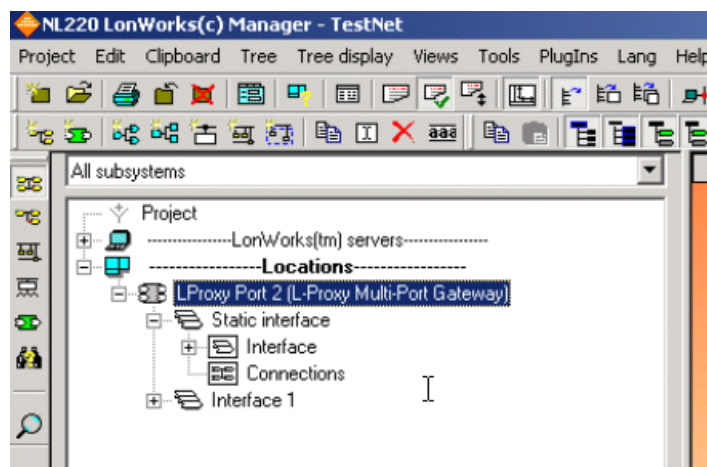


Figure 84: Interfaces of the L-Proxy device in tree.

You can repeat the above steps to create up to 5 virtual interfaces on every L-Proxy port. The different virtual interfaces for one L-Proxy port are only for logical grouping of the NVs.

You must repeat these steps for all L-Proxy ports that are connected to the network.

9.4.2 Creating Functional Blocks in LonMaker

Drag the Functional Block shape onto the drawing area. A dialog like the one in Figure 85 appears.

Under Device Name select *L-Proxy1 Port 2* (we use Port 2 in this example)

Under Functional Block Name select *Gateway[0]* (or *Gateway[1]*, or *Gateway[2]*, ...)

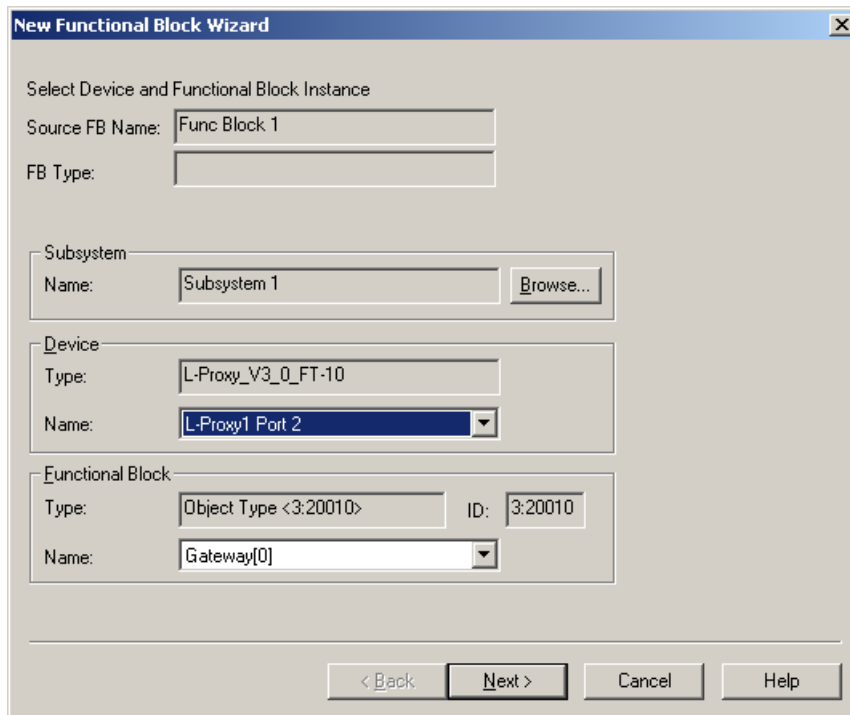


Figure 85: Select *L-Proxy Port 2* and *Gateway[0]* through *Gateway[7]* in order to create a functional block for the L-Proxy object on Port 2.

Click *Next*. The dialog shown in Figure 86 appears. Under FB Name select any of *Gateway[0]* through *Gateway[7]*.

Click *Finish*.

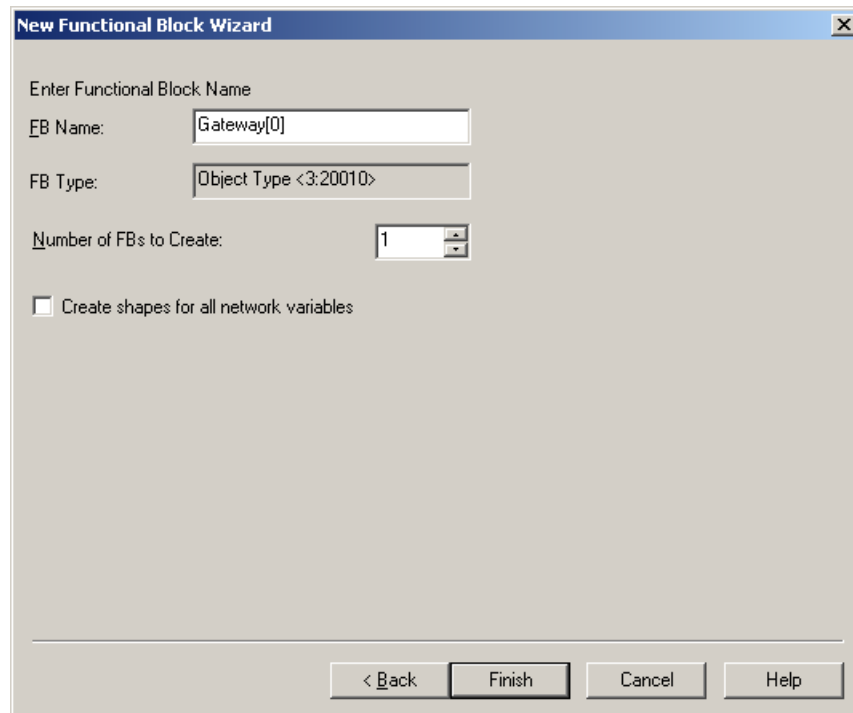


Figure 86: Enter the FB Name for L-Proxy Port 2.

An empty functional block as shown in Figure 87 appears in the drawing area.

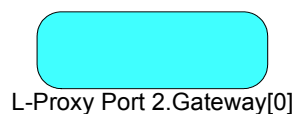


Figure 87: Empty functional block for L-Proxy Port 2.

You can repeat the above steps to create up to 5 Functional blocks on every L-Proxy port. The different functional blocks for one L-Proxy port are only for logical grouping in the LonMaker drawing.

You must repeat these steps for all L-Proxy ports that are connected to the network.

9.4.3 Creating Virtual Interfaces in Alex

After adding the L-Proxy node a virtual interface must be created for the device. In the tree view, select **Virtuelle Funktionseinheiten** of the newly created device. Click on *Neue virtuelle Funktionseinheit*

In the dialog, enter the name of the interface, for example **Gateway[0]**. You may create as many interfaces as needed (for example to sort network variables by functions).

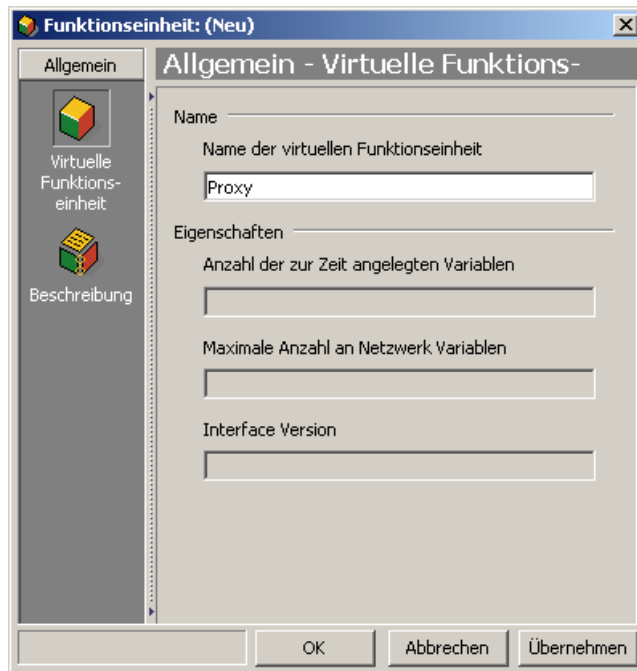


Figure 88: Creating a virtual interface in L-Proxy device

Click *OK*.

9.5 Dynamic Network Variables

After creating the functional block/virtual interface for the Proxy object we need to create the input and output network variables for the Proxy object. With LNS 3.x-based tools dynamic network variables can be used. Dynamic network variables are created during system configuration and can be added and deleted at any time whereas static network variables are created at system configuration time and are difficult to change afterwards.

Note: Always close the L-Proxy configuration utility when creating, adding, or deleting network variables in the Proxy functional block.

9.5.1 Creating a new dynamic network variable

Dynamic network variables are created by selecting the counterpart of the desired network variable binding. The dynamic network variable will inherit its properties from its counterpart, e.g., the SNVT. Figure 89 shows a simple network comprising 3 nodes and the newly created Proxy functional block.

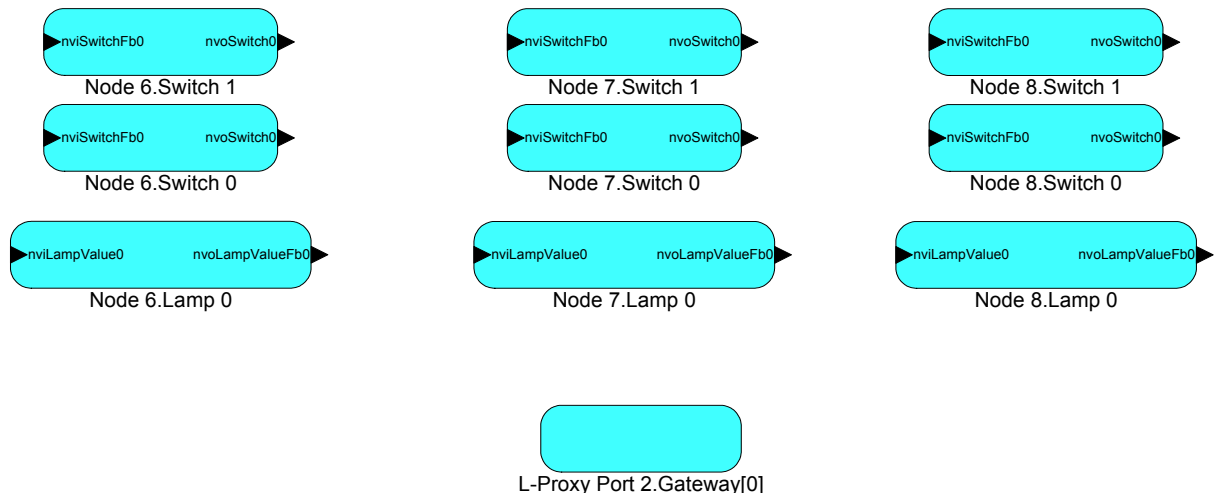


Figure 89: Simple network comprising 3 nodes and one L-Proxy Port.

Let's assume we want to connect network variable `nvoSwitch0` on Node 6 to L-Proxy. This means we need to create an input network variable in the Proxy object with the same type as `nvoSwitch0`. Please follow the steps below.

9.5.1.1 Creating dynamic NVs in NL-220

Drag the counterpart (Node 6.`nvoSwitch0`) Network Variable in the tree onto the virtual interface **Interface 1** of the L-Proxy device.

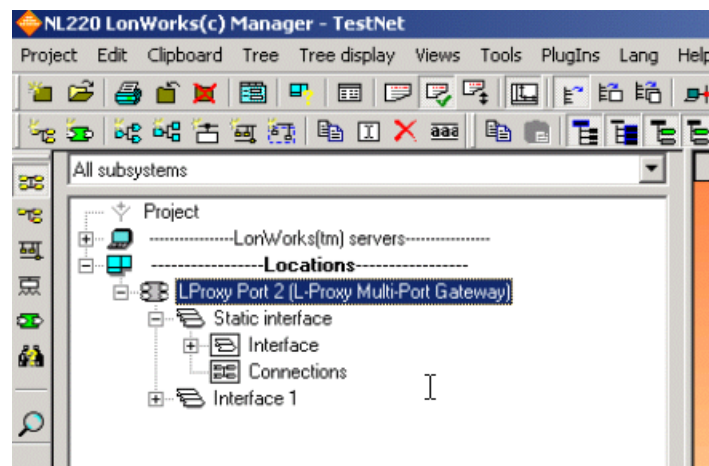


Figure 90 Dragging the counterpart network variable onto Virtual Interface 1.

This operation opens the connection window in working view (right view) and a new window pops up (see Figure 91).

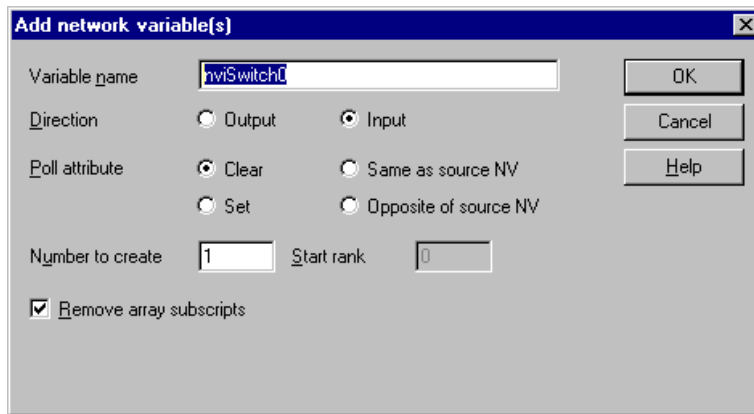


Figure 91: Add an input network variable to the L-Proxy virtual interface Interface 1.

This dialog is used to specify the properties of the new network variable. If you want to create multiple copies of the same network variable you can specify the number in the *Number to create* Field. This feature is especially useful to create multiple copies of the same output network variable. When creating multiple identical NVs please make sure that the “Remove array subscripts” is checked. Otherwise these NVs are not properly displayed in the L-Proxy configuration plug-in utility.

A new name is already suggested for this newly created network variable. In our case we keep the *Variable Name: nviSwitch0*.

Make sure that the Poll Attribute of the new NV is set properly. Set it to *Clear* if the NV is updated and set it to *Set* if the NV is polled. If the NV is polled both the source and the destination NV must be declared polled. Also if the NV is updated both the source and the destination NV must have the Poll Attribute cleared.

Click on *OK*.

Now the tree shows the newly created input network variable in the virtual interface **Interface 1** (you must open the virtual interface in the tree to display the network variable).

As shown in Figure 92 the connection window in the work view (right view) includes now the nvoSwitch0 of Node 6 and the nviSwitch0 of the L-Proxy device. You can create or cancel the connection.

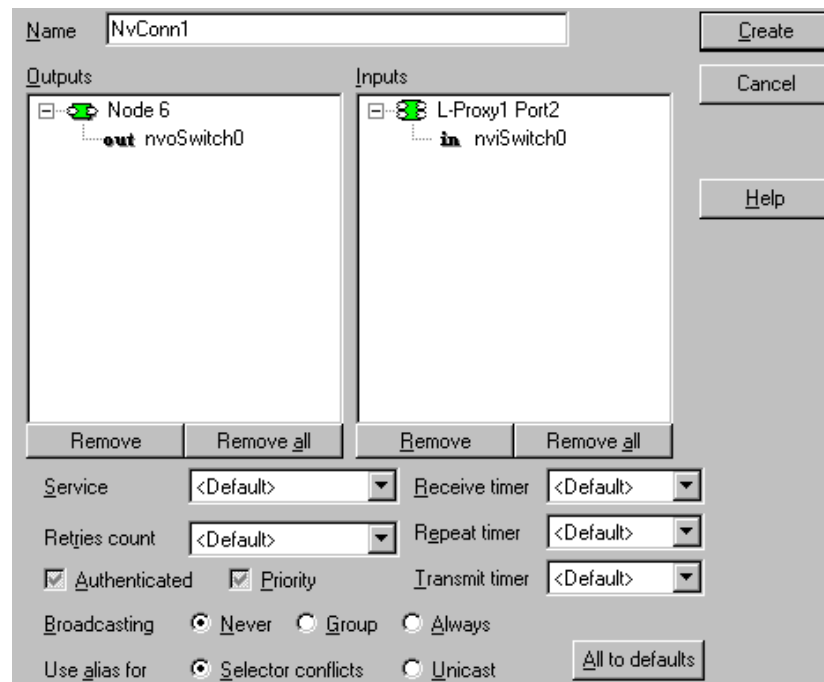


Figure 92: Connection window with the newly created L-Proxy variable and the Node 6 output variable.

9.5.1.2 Creating dynamic NVs in LonMaker

Drag the Input Network Variable shape onto the Proxy functional block. A new window appears (see Figure 93).

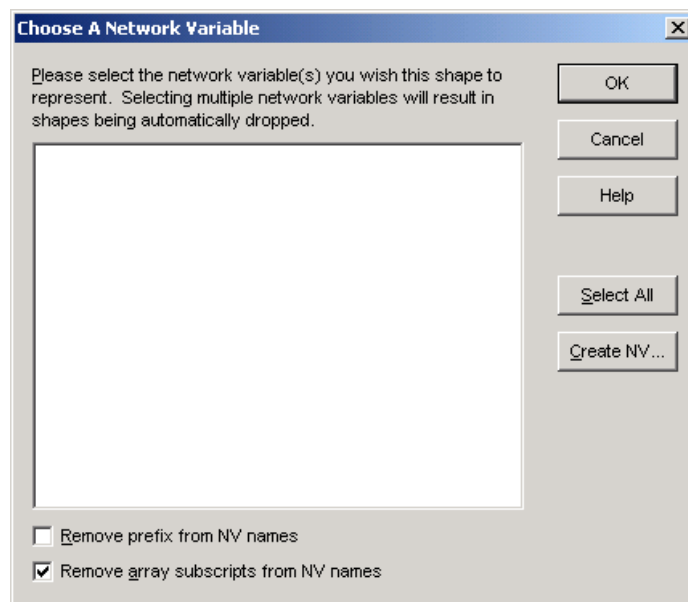


Figure 93: Add an input network variable to the Proxy functional block.

Click on *Create NV*. The dialog shown in Figure 94 appears. Specify the properties of the new network variable. If you want to create multiple copies of the same network variable you can specify the number in the *How many?* Field. This feature is especially useful to create multiple copies of the same output network variable.

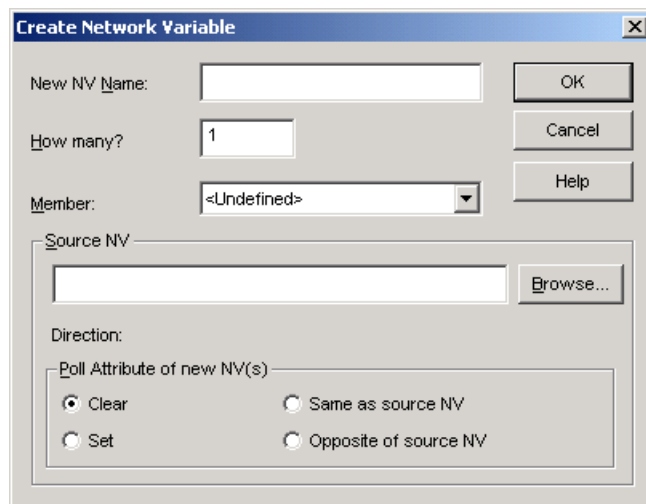


Figure 94: Create Network Variable dialog.

Click on *Browse...*

and select the counterpart network variable *nvoSwitch0* on Node 6 for this connection.

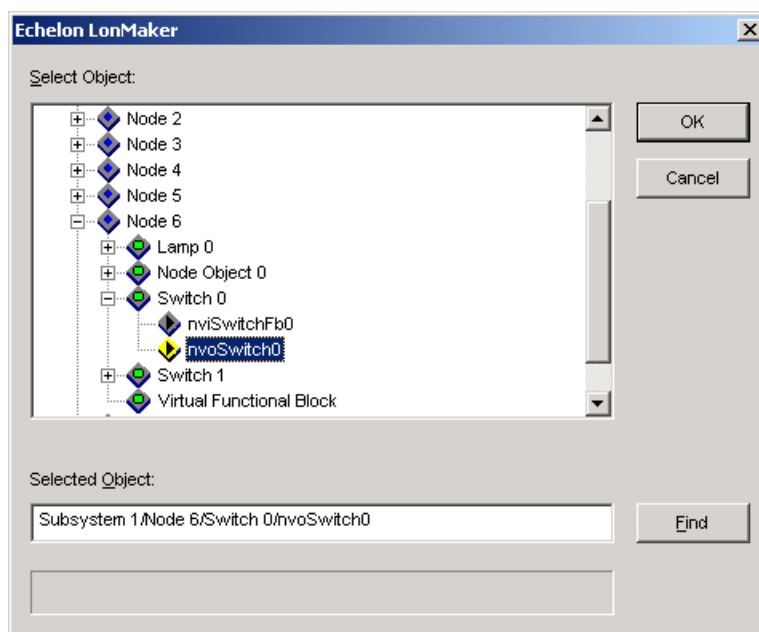


Figure 95: Select the counterpart NV on Node 6.

Click *OK*.

A new name is already suggested for this newly created network variable. In our case we keep the *New NV Name: nviSwitch0* as shown Figure 96.

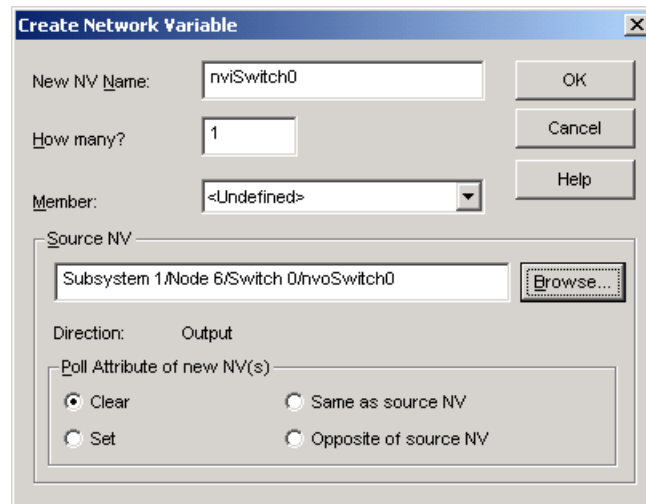


Figure 96: We keep the suggest name *nviSwitch0* for the new network variable.

Make sure that the Poll Attribute of the new NV is set properly. Set it to *Clear* if the NV is updated and set it to *Set* if the NV is polled. If the NV is polled both the source and the destination NV must be declared polled. Also if the NV is updated both the source and the destination NV must have the Poll Attribute cleared.

Click *OK*. The dialog shown in Figure 97 appears.

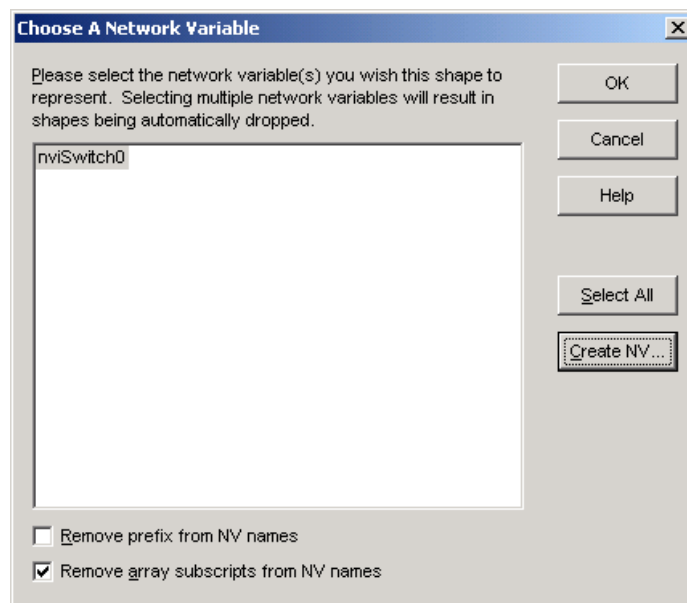


Figure 97: We have created a new input network variable in the Proxy functional block.

Click *OK*.

After the network drawing updates, it shows the newly created input network variable in the Proxy functional block.

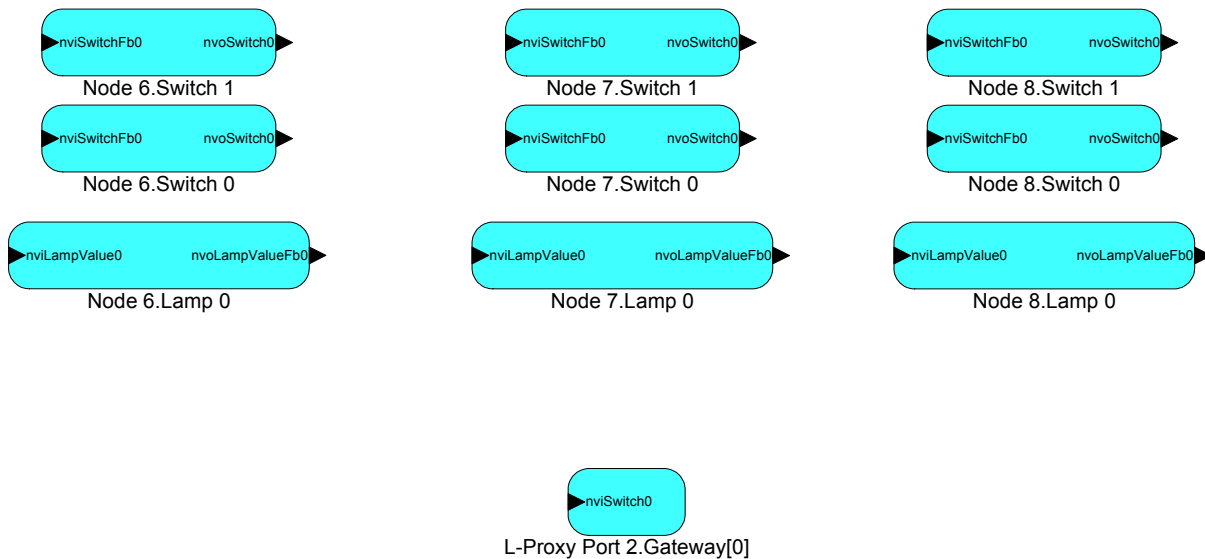


Figure 98: Updated network diagram that shows the new input network variable in the Proxy functional block.

9.5.1.3 Creating dynamic NVs in Alex

Select **Netzwerkvariablen** in the tree view of one of the virtual interfaces of the L-Proxy device. Click on *Neue Netzwerkvariable*.

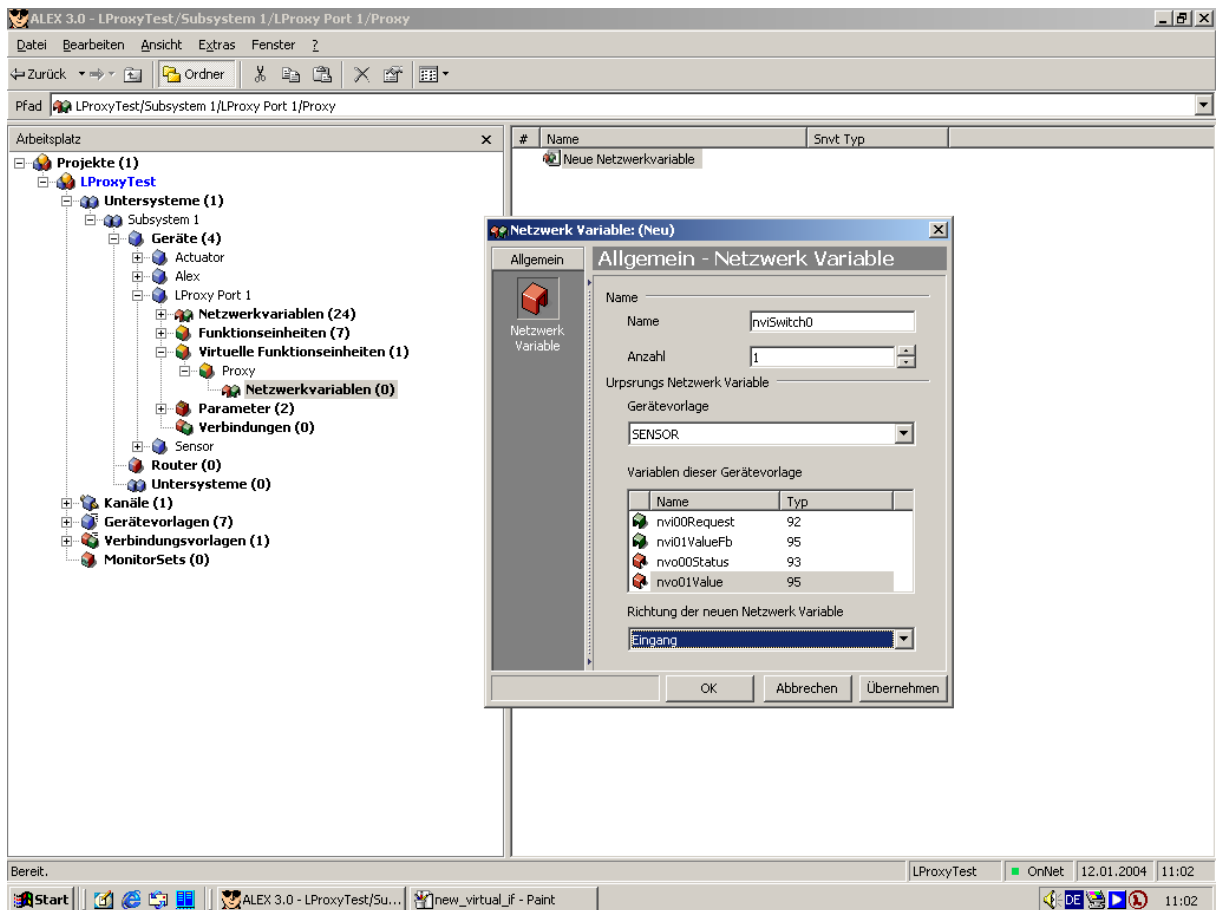


Figure 99: Add an input network variable to the L-Proxy virtual interface Proxy.

Enter the name for the network variable and the count how many network variables of this type should be created. In *Gerätevorlage*, select the device template of the node which hosts the network variable to which the L-Proxy network variable will be bound later. Select the counterpart network variable in the list and specify the correct direction (Eingang for an input network variable). Click OK.

Repeat this for all network variables which will be used on the L-Proxy.

9.6 Replace an L-Proxy

In the case of failure an L-Proxy might have to be replaced by another unit. Even if the configuration of the replacement unit is identical to the original one, the Node ID (NID) of the new unit is different. To account for that change, LNS provides the “replace” functionality.

When replacing a device in LNS, the association of the NID is transcribed to the new unit, given the new unit has an identical static NV interface. In the replace procedure LNS re-creates the dynamic variables and commissions the replacement unit.

9.6.1 Replace in NL220

Let's assume there is a device 'L-Proxy' in the LNS database as shown in Figure 100. To replace the device, right-click on the device in the device tree and select 'Network→Replace'.

Alternatively, the device can be selected and the device replacement can be started by pressing 'Ctrl+I'.

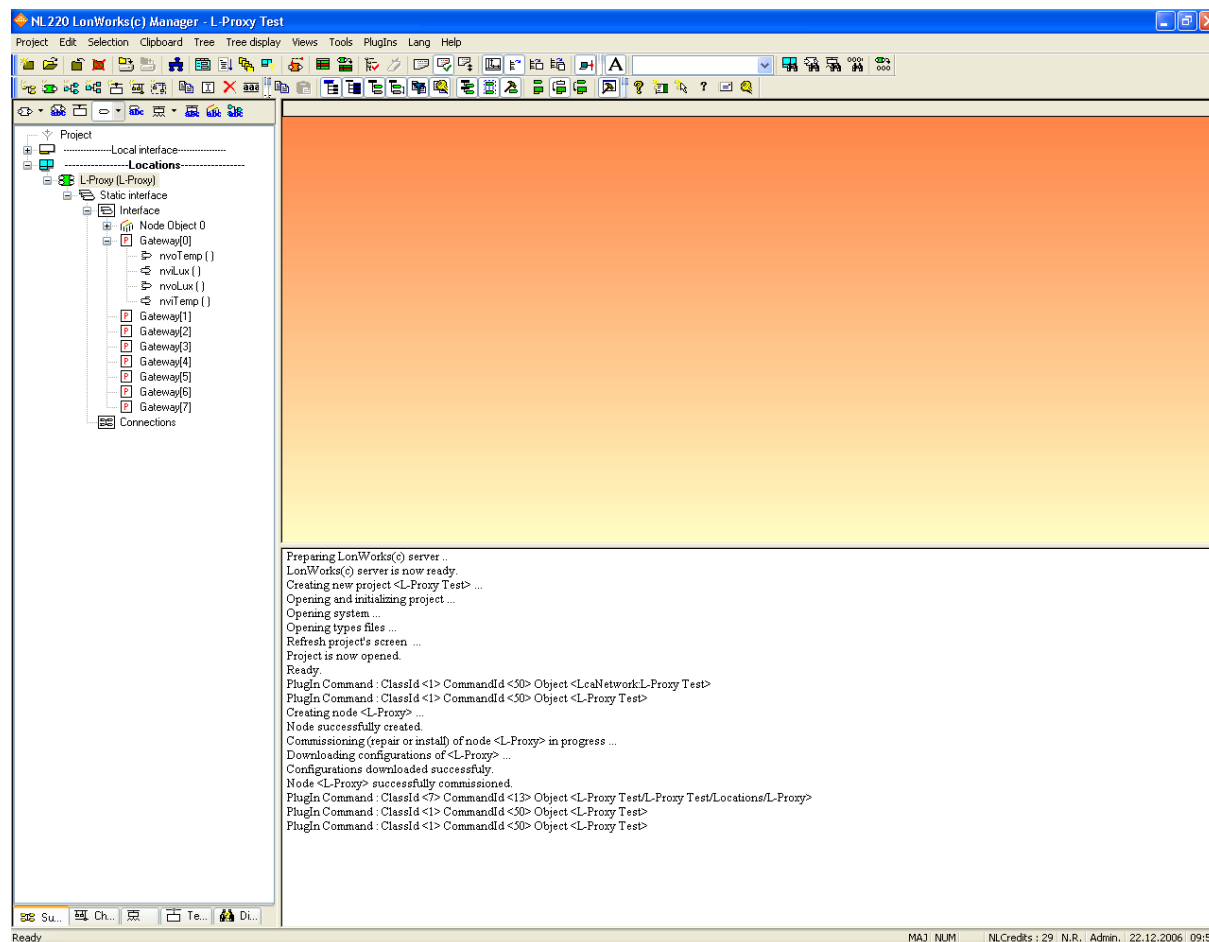


Figure 100: L-Proxy device in NL-220.

This opens the device replacement dialog box (see Figure 101).

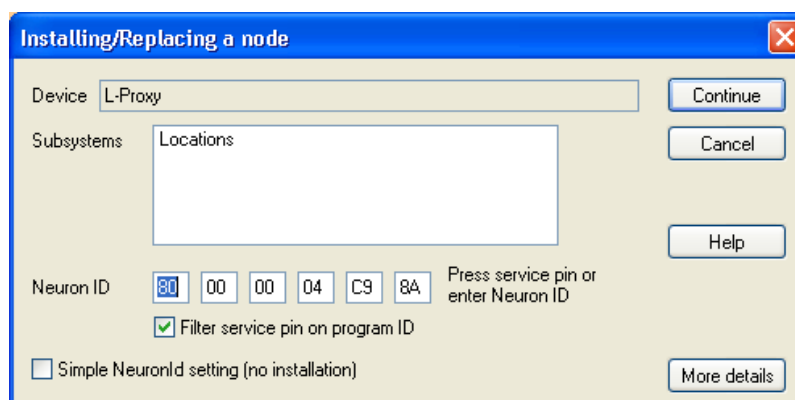


Figure 101: NL-220 node replacement dialog.

Press the service pin of the L-Proxy port to replace and press 'Continue' to replace the device. After the service pin has been received, NL-220 commissions the replacement unit's port, creates the dynamic NVs again (if any) and installs the bindings.

9.6.2 Replace in LonMaker

Let's assume there is a device 'lproxy 1' in the LNS database as shown in Figure 102. To replace the device right-click on the device shape and select 'Replace...'. This opens the LonMaker replace wizard as shown in Figure 103.

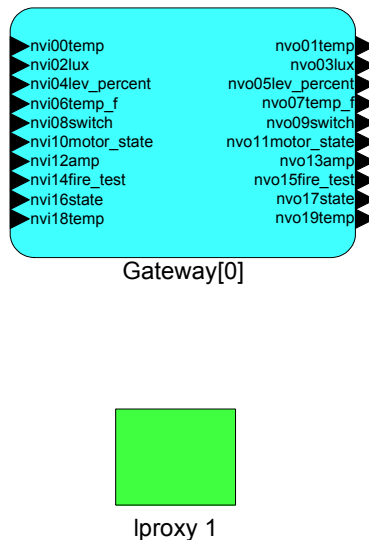


Figure 102: LonMaker drawing with one L-Proxy device.

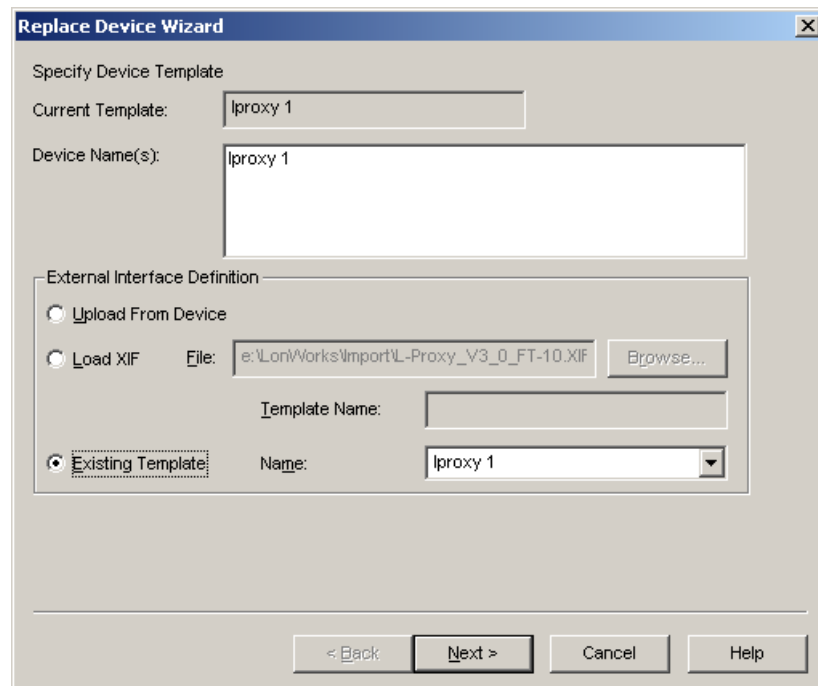


Figure 103: LonMaker replace wizard.

Choose the existing template and click Next.

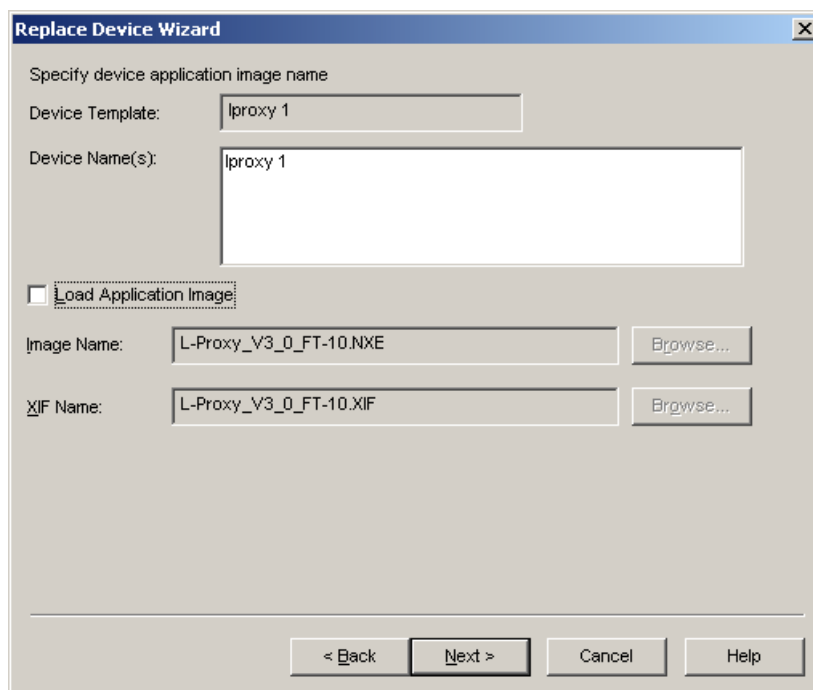


Figure 104: Click Next without loading an application image.

In the following window shown in Figure 104 click Next. Then select 'Online' as shown in Figure 105.

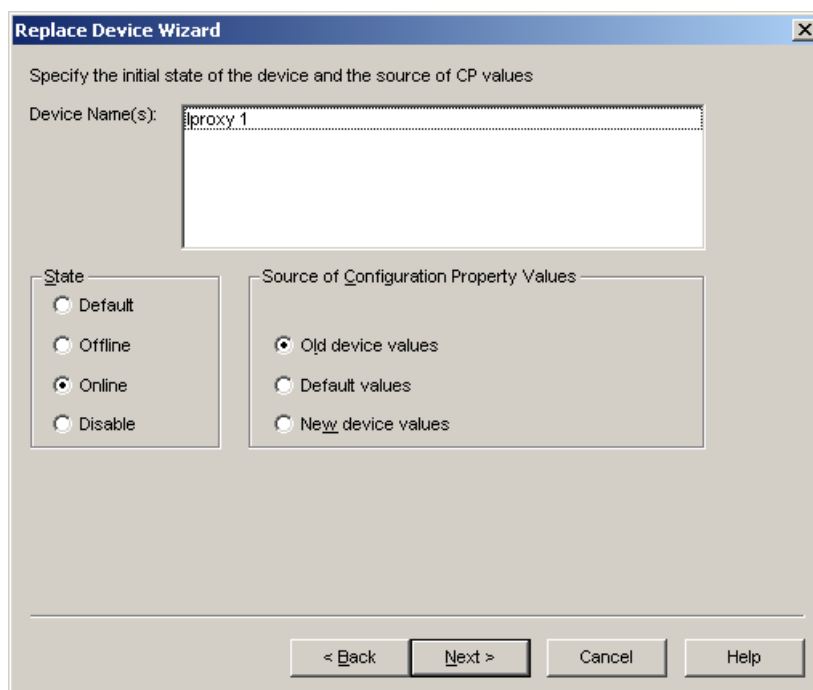


Figure 105: Select online state and click Next.

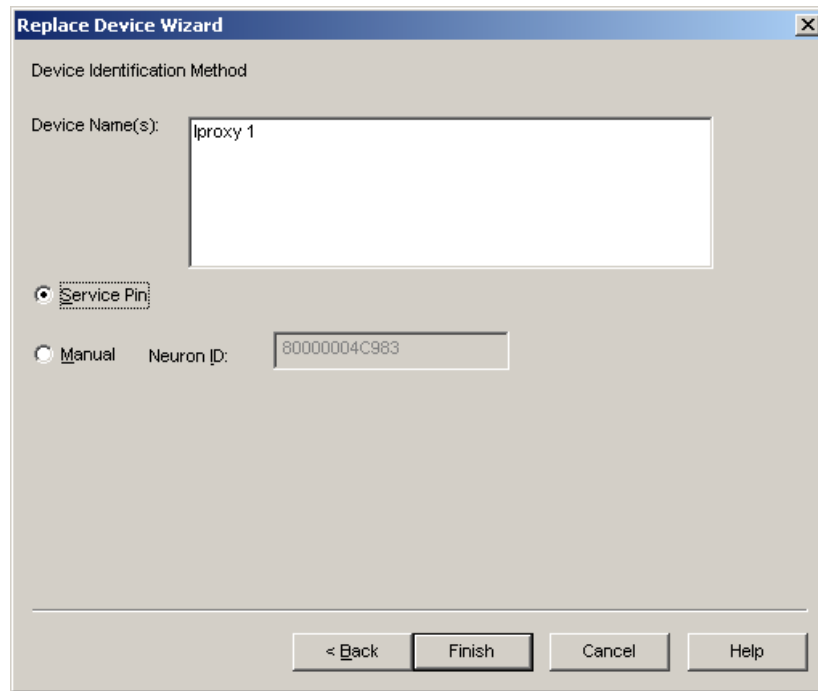


Figure 106: Select Service Pin and click Finish

Finally select the service pin method and click on Finish as shown in Figure 106. Then the service pin requestor opens as shown in Figure 107. Press the service pin on the replacement L-Proxy on the correct port. For IP-852 ports it is recommended to use the Web interface (see Section 6.1).

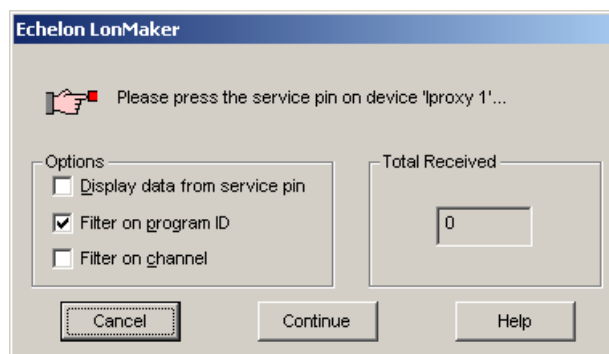


Figure 107: Waiting for the service pin on the replacement unit

After the service pin has been received, LonMaker commissions the replacement unit's port, creates the dynamic NVs again (if any) and installs the bindings.

9.6.3 Replace in Alex

Let's assume there is a device 'LProxy Port 1' in the LNS database as shown in Figure 108. To replace the device, right-click on the device in the device tree and select 'Ersetzen'.

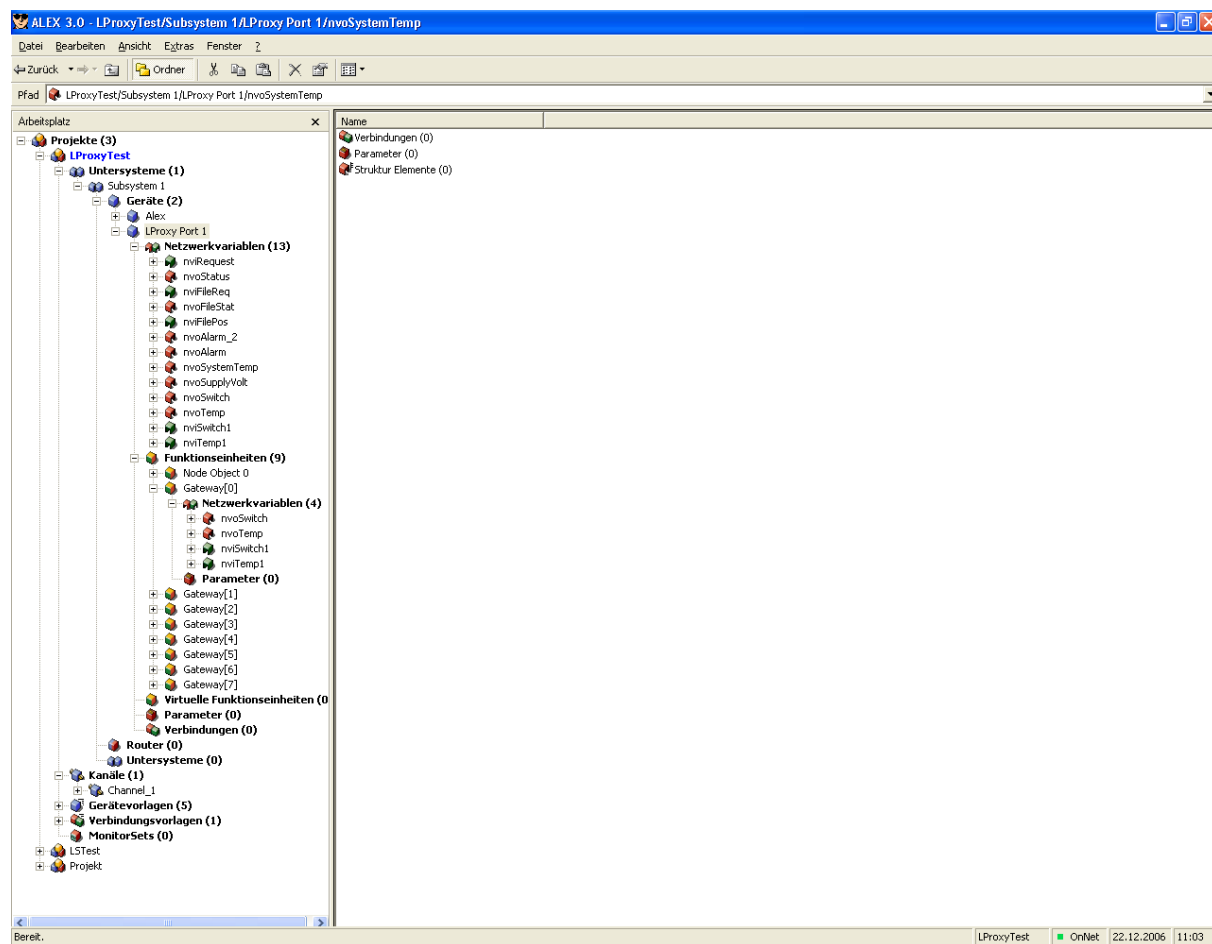


Figure 108: L-Proxy device in Alex.

This opens the device replacement dialog box (see Figure 109).

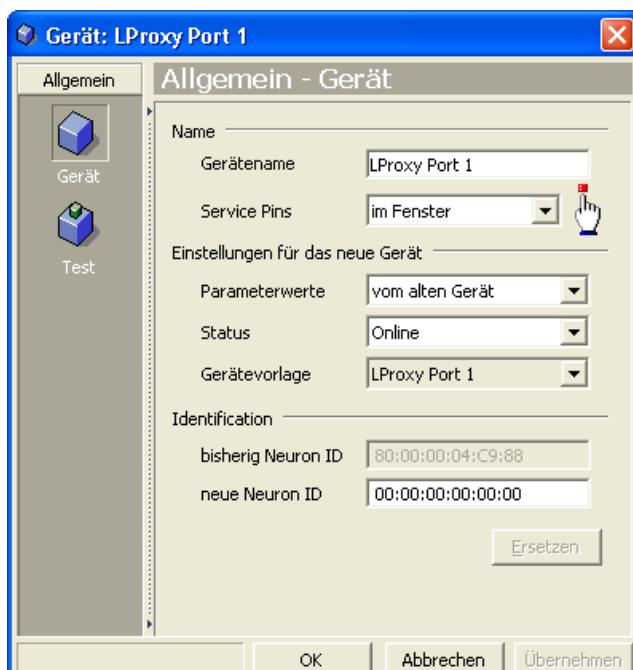


Figure 109: Device replacement dialog in Alex.

Press the service pin of the L-Proxy port to replace and press 'OK' to replace the device. After the service pin has been received, Alex commissions the replacement unit's port, creates the dynamic NVs again (if any) and installs the bindings.

9.7 Using the L-Gateway Configuration Software

The L-Proxy comes with a configuration software to configure the L-Proxy's port interfaces and create the internal connections. The configuration software can be started as an LNS plug-in or as a stand-alone tool.

9.7.1 Starting as an LNS plug-in

In LonMaker the plug-in is started by right clicking on the L-Proxy device shape or the L-Proxy functional block and selecting *Configure...* from the pop-up window.

In NL-220 the Plug-in is started by right clicking on the L-Proxy node, then selecting the Option **L-Gateway Configuration Plugin** in the **PlugIns** sub menu.

In Alex the Plug-in is started by right clicking on the L-Proxxy device and selecting the **L-Gateway Configuration Plugin** in the **Starte PlugIn** sub menu.

A window similar to what is shown in Figure 110 should appear.

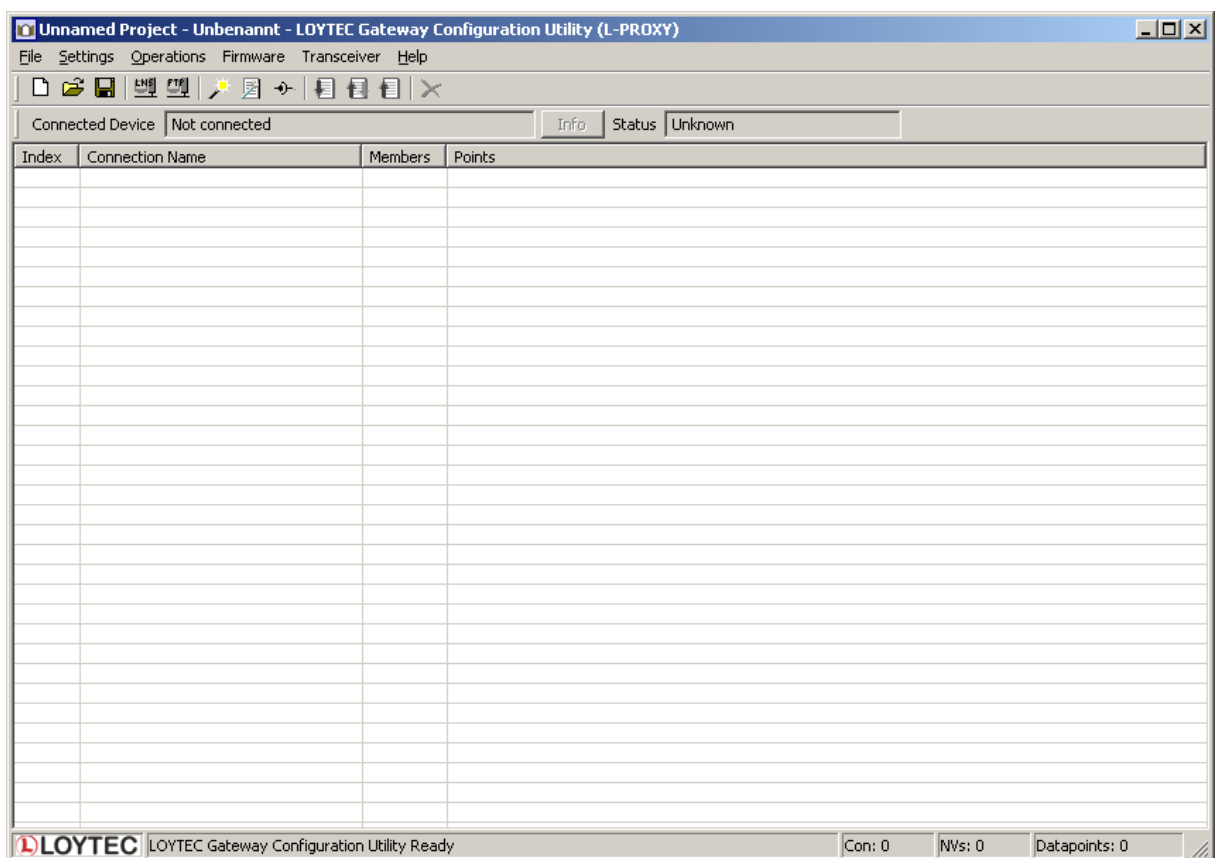
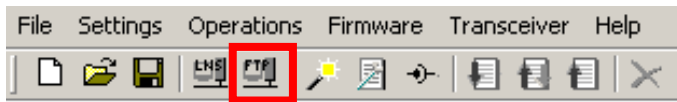


Figure 110: L-Gateway configuration software main window.

9.7.2 Starting Stand-alone

To start the L-Gateway configuration software in stand-alone mode for the L-Proxy select the Windows Start menu → LOYTEC L-Gateway Configuration → L-Proxy Configuration. A window similar to what is shown in Figure 110 should appear.

If the L-Proxy is already connected to the network it is recommended to connect the configuration software to the L-Proxy. Select the FTP connection method by clicking on the FTP connect button



in the tool bar. This will open the FTP connect dialog as shown in Figure 111. Enter the IP address of the L-Proxy, the user and password and click Connect. The default user is “admin” and the default password is “admin”.

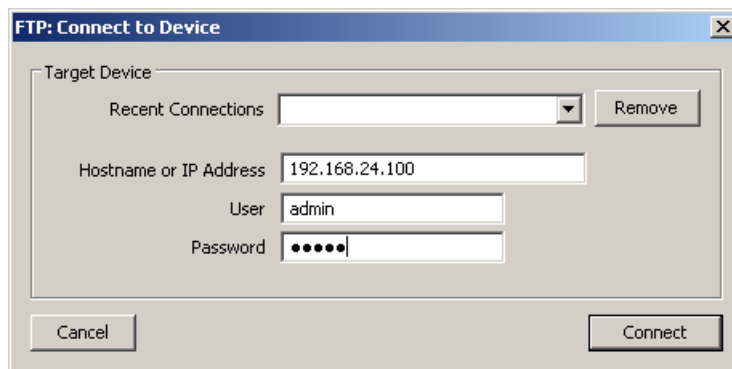


Figure 111: FTP connection dialog.

If the L-Proxy is not yet connected to the network, go to the Firmware menu and select the firmware version of the L-Proxy to be configured.

9.7.3 Uploading the Port Interface

To get the current network variable configuration of the L-Proxy, the port interface needs to be uploaded. Click on the upload button



in the tool bar. The configuration upload dialog opens up as shown in Figure 112. Click on the button *Start* to start the transfer. This will upload the configuration of all ports, if the software is connected stand-alone via FTP or the network variable interface, for which the LNS plug-in was started for. If the L-Proxy is on-line, also the current connection information and manually created dynamic NVs are uploaded.

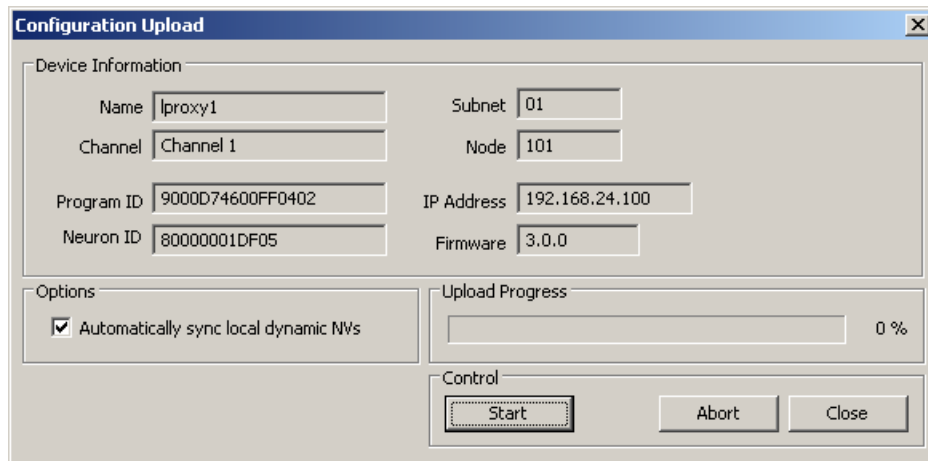
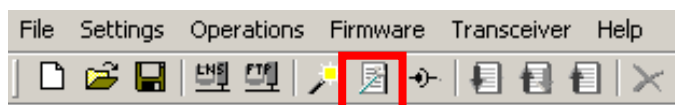


Figure 112: Configuration upload dialog.

9.7.4 Configure Static NVs

Unlike dynamic NVs, static NVs cannot be created in the network management tool. They are part of the static interface and are usually compiled into the device. The L-Proxy can be configured to change its static interface and boot with a new one. To change that static NV interface, the L-Gateway configuration software can create static NVs in the port interface definition.

Select the Data Point Manager using the speed button



in the tool bar. In the data point manager select the port folder, for which a static NV shall be created. Then right-click in the data point list and select “New ...” in the context menu. This opens the NV creation dialog as shown in Figure 113.

Enter a data point name and a programmatic name. The programmatic name is the name of the static NV, which is being created, while the data point name is used for matching in the auto-connect feature (see Section 9.7.12). Select a SNVT and a direction. A functional block can also be selected to group certain static NVs into separate functional blocks if desired. Then click “Create Static NV”.

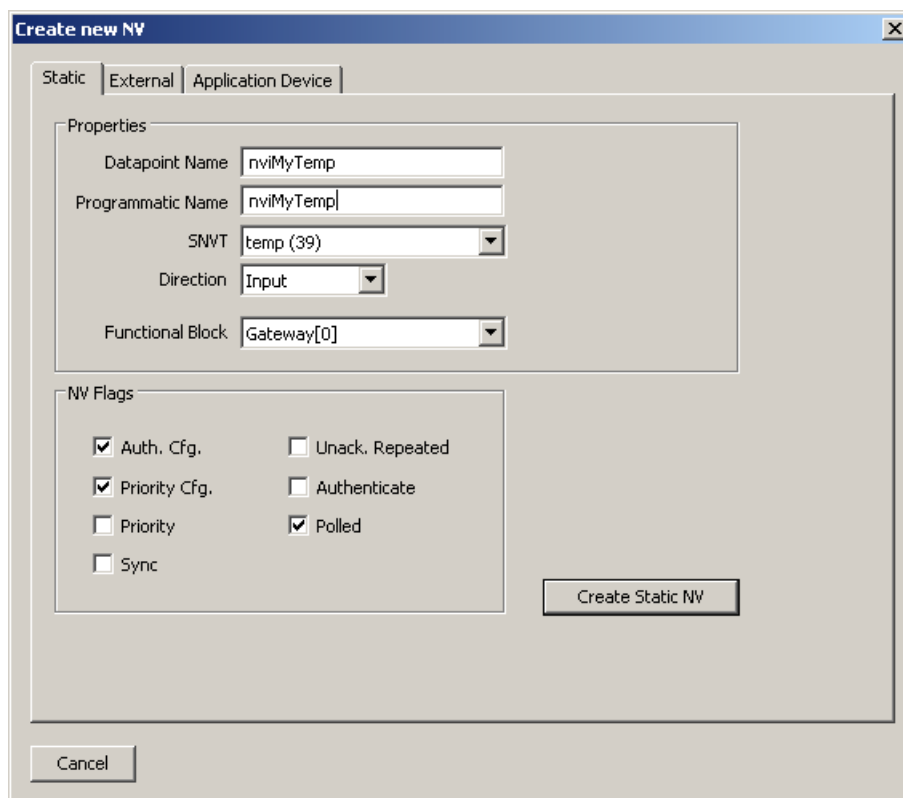


Figure 113: Create a static NV manually.

Figure 114 shows how the example static NV appears in the data point manager.

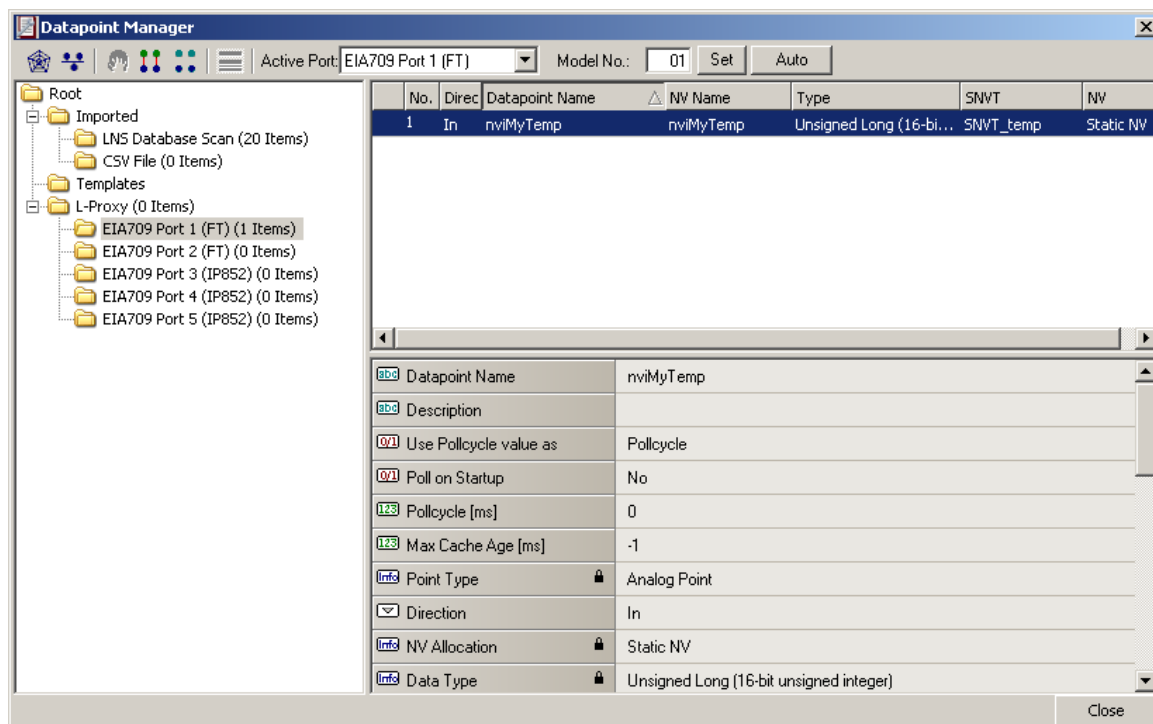


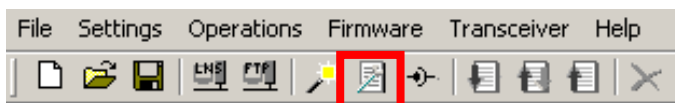
Figure 114: Static NV created in the data point manager.

Note, that the model number will change as soon as static NVs are added or modified in the data point manager. This reflects the new static NV interface the L-Proxy port will have after the configuration download.

9.7.5 Configure External NVs

External NVs are not actually allocated NVs on the L-Proxy. Instead, the L-Proxy uses polling to read data from and explicit updates to write data to external NVs. Since external NVs are not affecting the static NV interface of an L-Proxy port, they can be used to extend an L-Proxy port interface definition at run-time, when no LNS with dynamic NVs is available.

Click on the “Open Datapoint Manager” button



in the tool bar to open the data point manager dialog. In the data point manager select the port folder, for which an external NV shall be created. Then right-click in the data point list and select “New ...” in the context menu. This opens the NV creation dialog. Click on the tab “Application Device” to create a new target device as shown in Figure 115. Enter the Node ID, device name and subnet/node address of the EIA-709 device, where the external NV is located. Then click on the button “Create Application Device”.

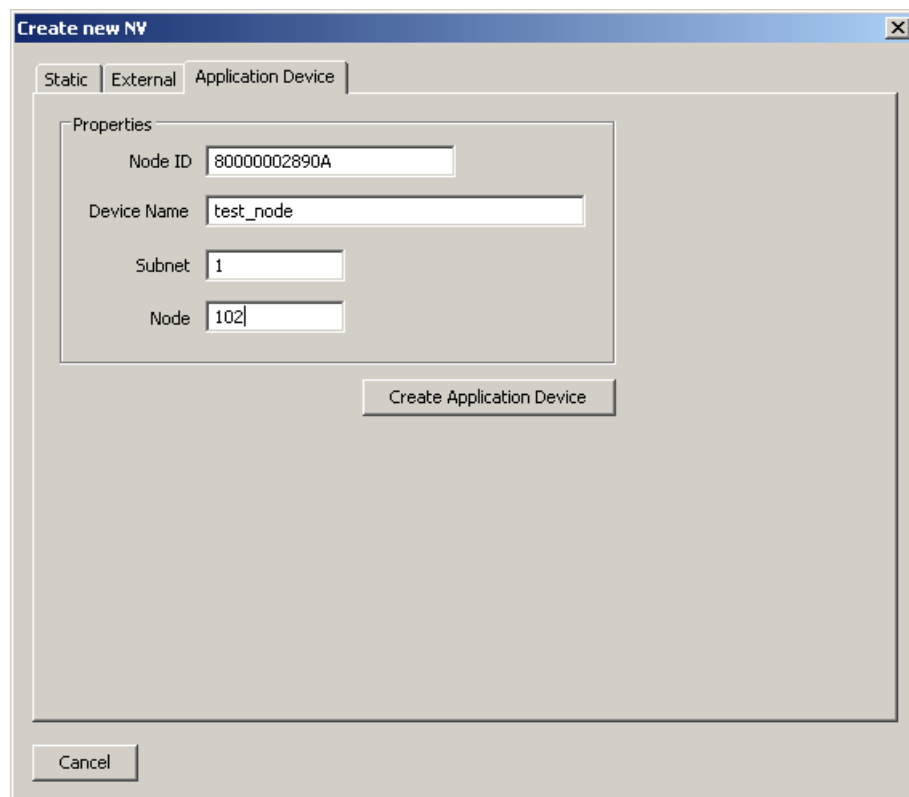


Figure 115: Create a new application device.

Then switch over to the tab “External” as shown in Figure 116. Select the device in the device list on the left-hand side. Then enter the properties of the external NV on that device, starting with the local data point name, the remote programmatic NV name, the SNVT and direction. Note, that the direction is the direction of the external NV on the L-Proxy. Therefore, the remote nvo00_switch becomes an input on the L-Proxy. Also enter the NV selector and the NV index in decimal. Choose the preferred addressing mode, e.g. Node ID.

The screenshot shows a dialog box titled "Create new NV" with three tabs: "Static", "External", and "Application Device". The "External" tab is selected. On the left, under "Select a Device", there is a list box containing "lproxy1", "test500", and "test_node", with "test_node" selected. Below the list is a "Remove Device" button. At the bottom left is a "Create External NV" button. On the right, the "Properties" section contains several fields: "Datapoint Name" (text box with "my_external_switch"), "Remote NV Name" (text box with "nvo00_switch"), "SNVT" (dropdown menu with "switch (95)"), "Direction" (dropdown menu with "Input"), "NV Selector" (text box with "399"), "NV Index" (text box with "0"), and "Address Type" (dropdown menu with "NodeID"). Below the properties is an "NV Flags" section with seven checkboxes: "Auth. Cfg.", "Authenticate", "Priority Cfg.", "Priority", "Unack. Repeated", "Polled", and "Sync". A "Cancel" button is at the bottom left of the dialog.

Figure 116: Create a new external NV.

Finally, click “Create External NV” to add this NV to the data point list. The external NV now appears in the port interface definition as shown in Figure 117. For polled NVs adapt the poll cycle to your needs.

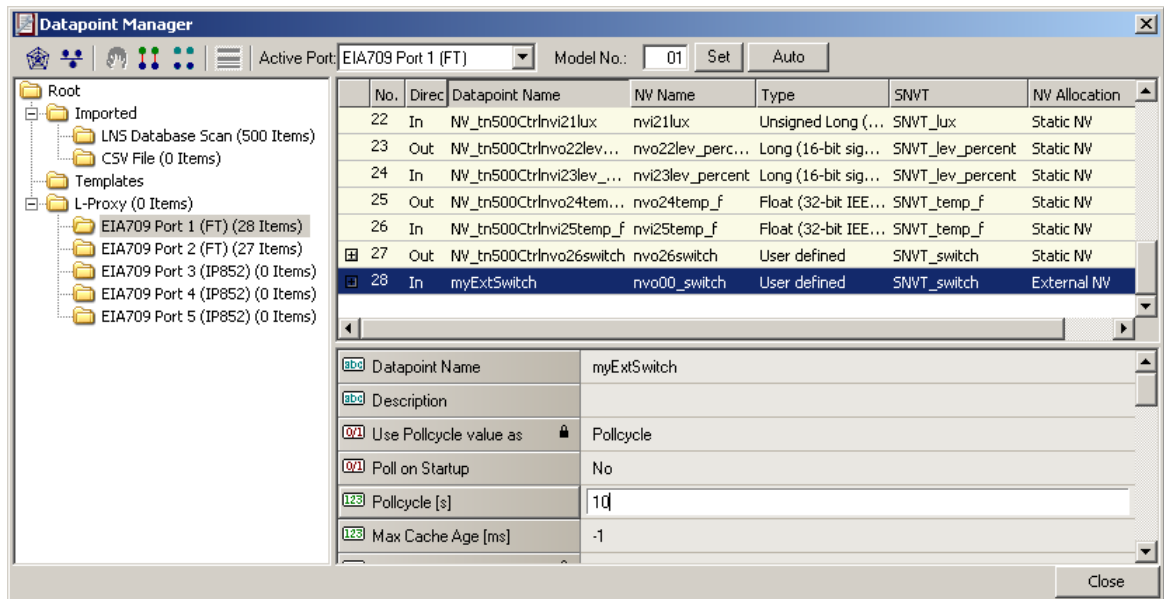


Figure 117: Manually created external NV in the port interface definition.

When adding many external NVs, they can also be imported from a CSV file. The format is specified in 12.1. This method can be especially useful, if a non-LNS tool provides an export filter for this format. In the data point manager select the active port and then right-click on the folder “CSV File” as shown in Figure 118. In the context menu select “Import File ...”. This opens a file requestor. Choose an NV import file.

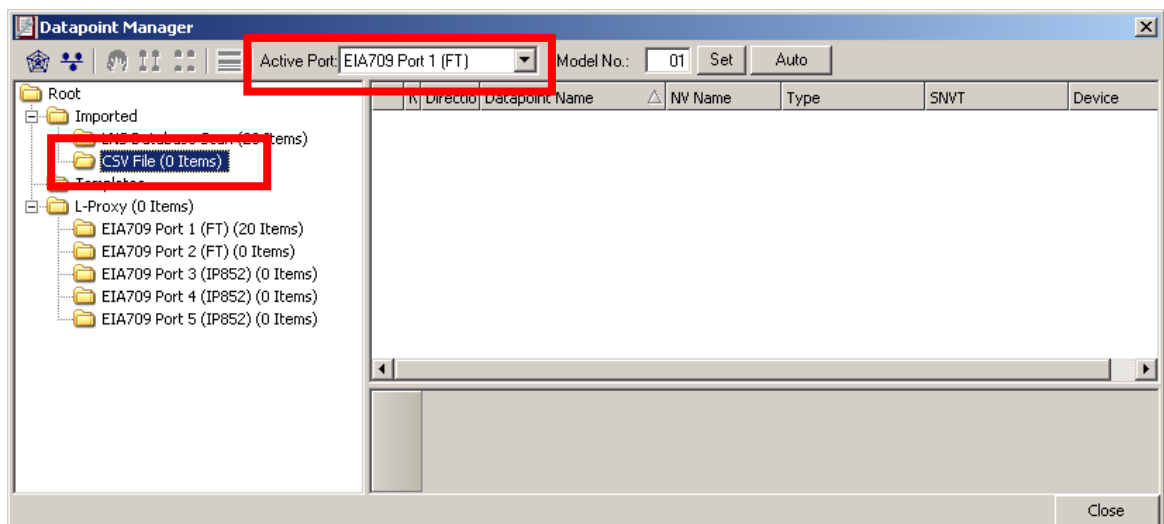


Figure 118: Importing external NV definitions.

The import populates the CSV File folder as shown in Figure 119.

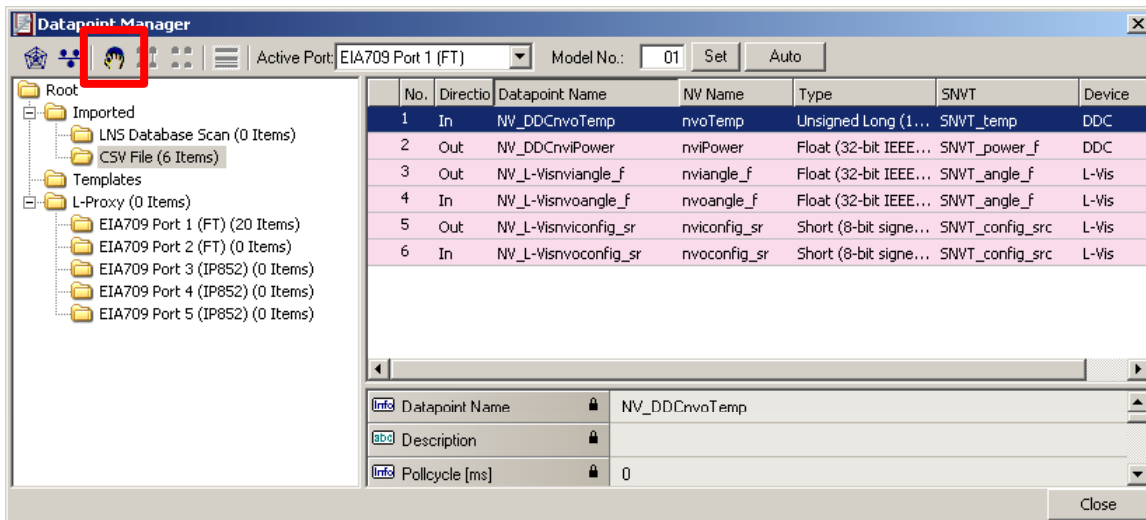


Figure 119: Imported NV definitions.

Select the NVs you want to use on the L-Proxy and then click on the “Use on device” button in the tool bar. Figure 120 shows the external NV used as an additional NV in the port interface definition. Note, that the NV type is “External NV”. For inputs also note, that the poll cycle can be edited in the property view below.

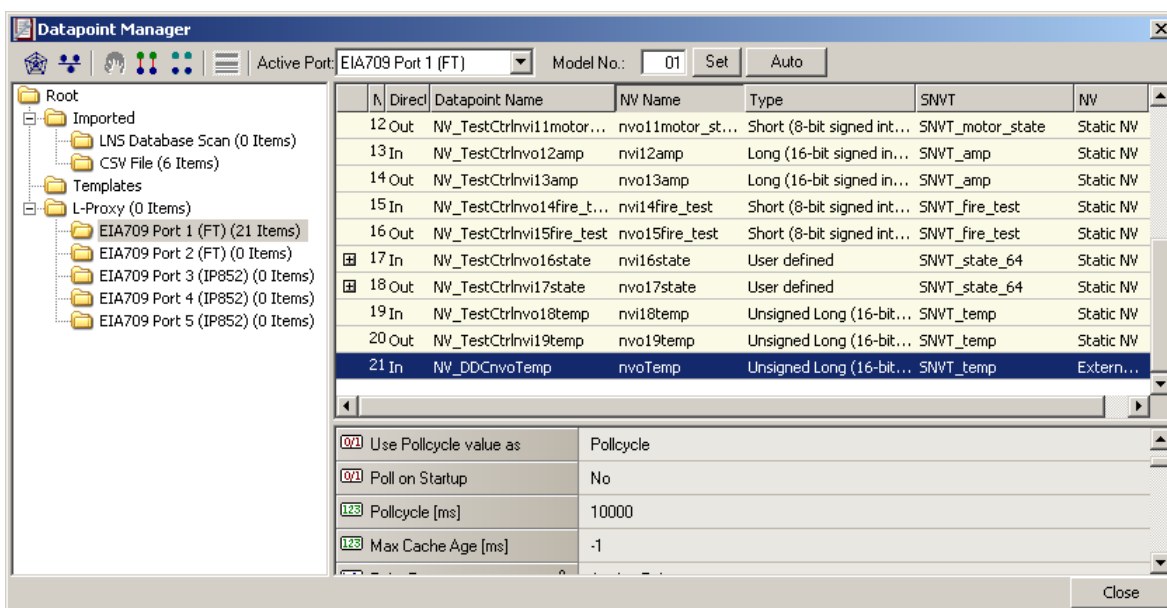
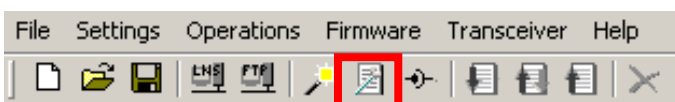


Figure 120: External NV added to port interface definition.

9.7.6 Extract and Save the Port Interface Definition

To exchange the port interface definitions, engineers need to export and import the port interface definition files (.itf). Access to these functions is given through the Datapoint Manager dialog. To open this dialog click on the “Open Datapoint Manager” button



in the tool bar. This opens the Datapoint Manager dialog as shown in Figure 122.

To upload dynamic NVs of the port to be exported, right-click on the port folder. In the context menu select “Sync Dynamic NVs”. The L-Gateway configuration software then loads any new dynamic NVs, which have been created and are not yet part of the port interface definition. The process completes when the dialog shown in Figure 121 appears. Click on Finish. The new dynamic NVs then appear in the data point list and can be edited.

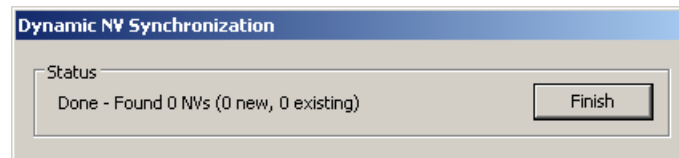


Figure 121: Synchronizing dynamic NVs from the device.

To export the port interface definition, right-click on the port folder. The example in Figure 122 refers to Port 2 (FT). In the context menu select “Export Interface ...” to export the port interface definition file. This opens a file requestor. Save the port interface definition file giving it a useful name, e.g. as “myproxy-port2.itf”.

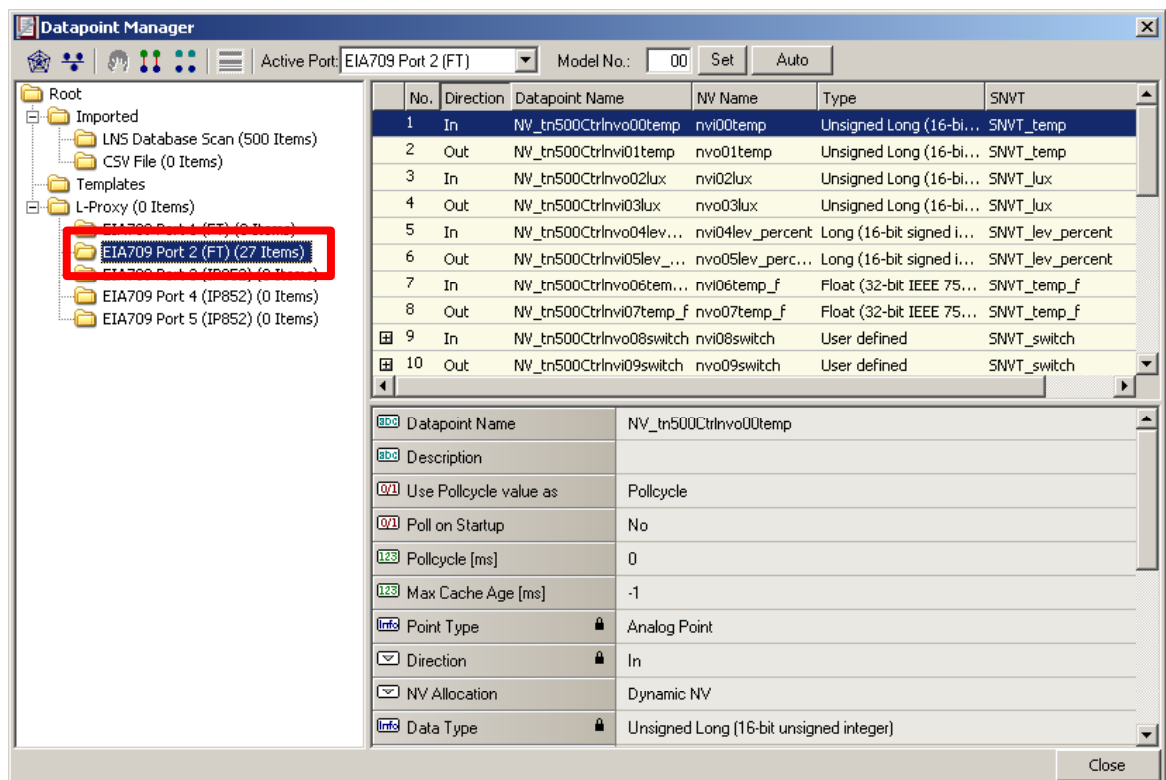
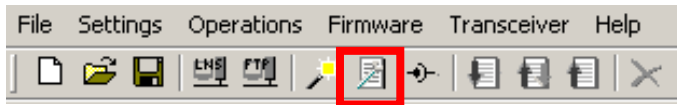


Figure 122: Export the port interface definition in the Datapoint Manager dialog.

To import a port interface definition file, right-click on the port folder and select “Import Interface ...”. This opens a file requestor, where the corresponding .itf file can be chosen. If the new port interface contains additional NVs they are created. If NVs have been removed in the new port interface, which are part of a current connection, the user is prompted whether these NVs shall really be deleted.

9.7.7 Build XIF for Port Interface

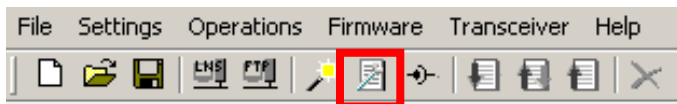
To create a XIF file for a static NV port interface, click on the “Open Datapoint Manager” button



in the tool bar. This opens the Datapoint Manager dialog as shown in Figure 122. In the dialog, right-click on the port folder, for which XIF file shall be created. The example in Figure 122 refers to Port 2 (FT). In the context menu select “Build XIF ...”. This opens a file requestor where the XIF file name needs to be entered. Select a useful name to identify the L-Proxy port, e.g. as “myproxy-port2.xif”.

9.7.8 Import the Port Interface Definition

To integrate the port interface definitions, which other engineers have created for the L-Proxy, one needs import the port interface definition files (.itf) for those ports. Open the data point manager dialog by clicking on the “Open Datapoint Manager” button



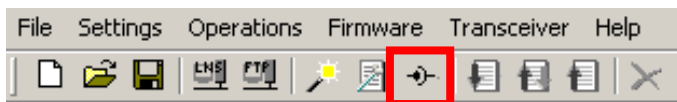
in the tool bar. This opens the Datapoint Manager dialog as shown in Figure 122. In the dialog, right-click on the port folder, for which the port interface definition shall be imported. The example in Figure 122 refers to Port 2 (FT). In the context menu select “Import Interface ...” to read in the port interface definition file.

9.7.9 Create a new connection

After having configured the network variable interface definitions on the L-Proxy ports the L-Proxy internal connections between the different input and output network variables can be created. Note, that it doesn't matter whether the network variables that are connected reside on the same port, on different ports, in the same domain, or in different domains.

A connection is an internal mapping in the L-Proxy between input and output network variables. A connection always consists of *one* hub network variable and *one or multiple* target network variables. Hub NVs can be input or output network variables. If the hub NV is an input NV, then the target NVs must be output NVs and vice-versa.

To manually create a new connection click on the “Create a new connection” button



in the tool bar. This will bring up the connection dialog as shown in Figure 123.

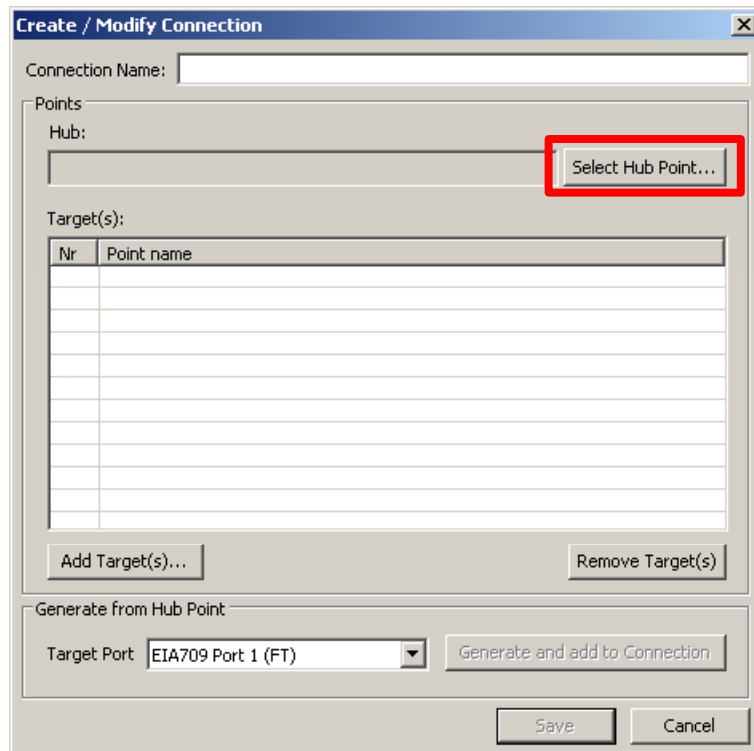


Figure 123: Connection Dialog: Select Hub.

Click on “Select Hub Point ...” to select the hub point. This opens the Datapoint Manager dialog. Select the data point in that dialog as shown in Figure 124 and click on “Add selected points”.

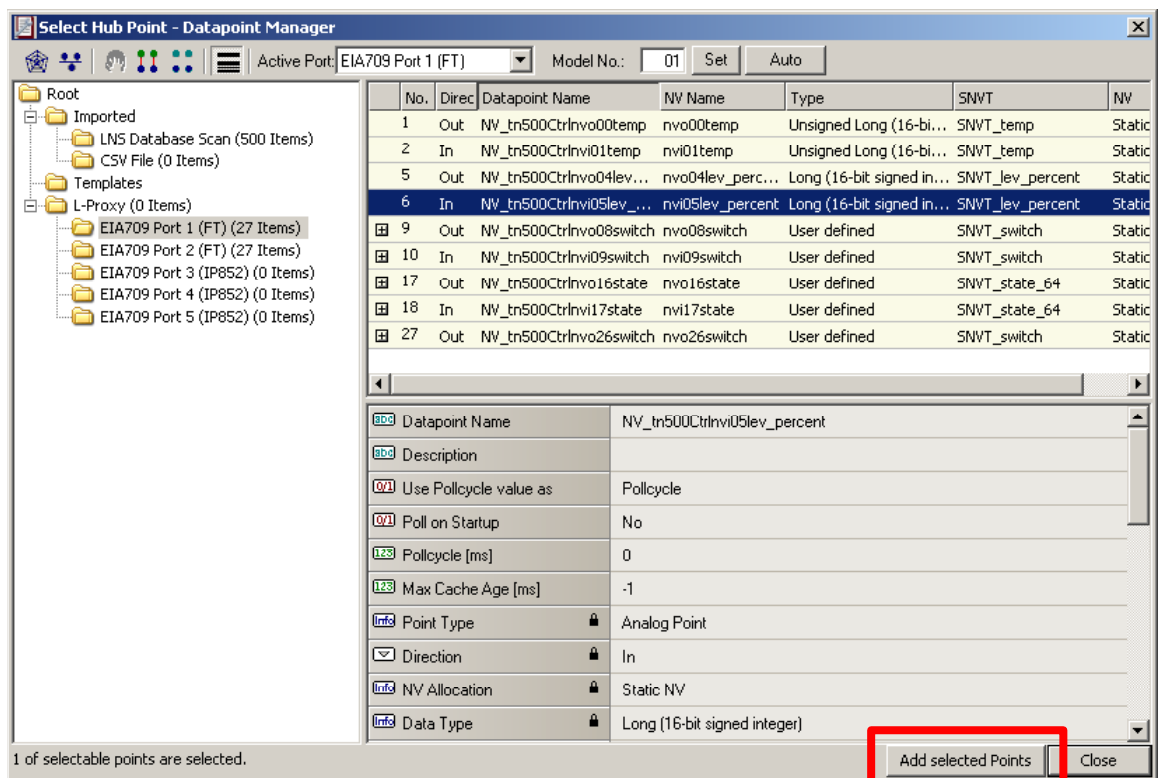


Figure 124: Select a hub point in the Datapoint Manager.

Then click on “Add Target(s)...” in the connection dialog as shown in Figure 125.

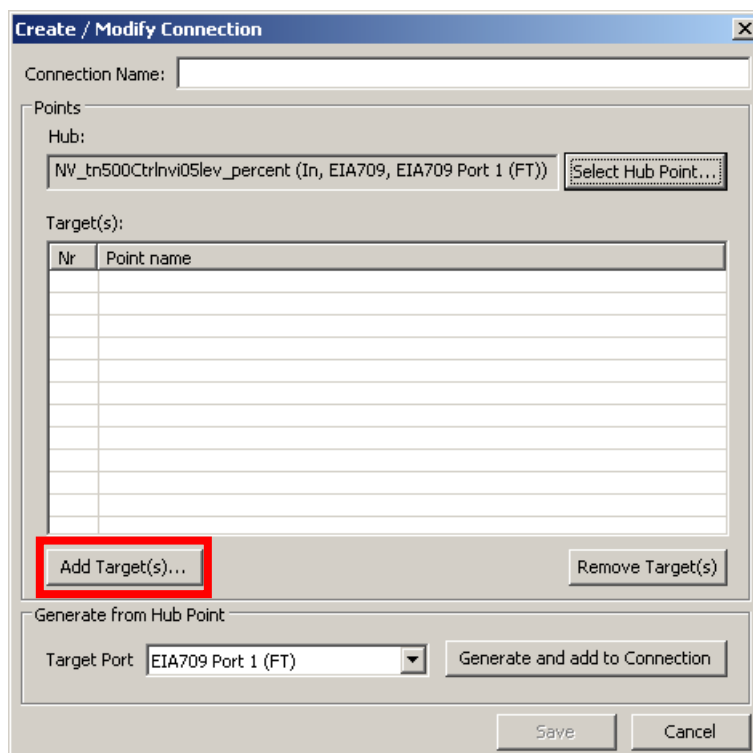


Figure 125: Connection Dialog: Select Target.

This opens the Datapoint Manager dialog again. Select the target points in that dialog. You may use multi-select to select more than one data point at a time. To select a SNVT structure member only click on  to expand the data point and select the desired member point. The example shown in Figure 126 uses a single data point as the target. Then click on “Add selected Points”.

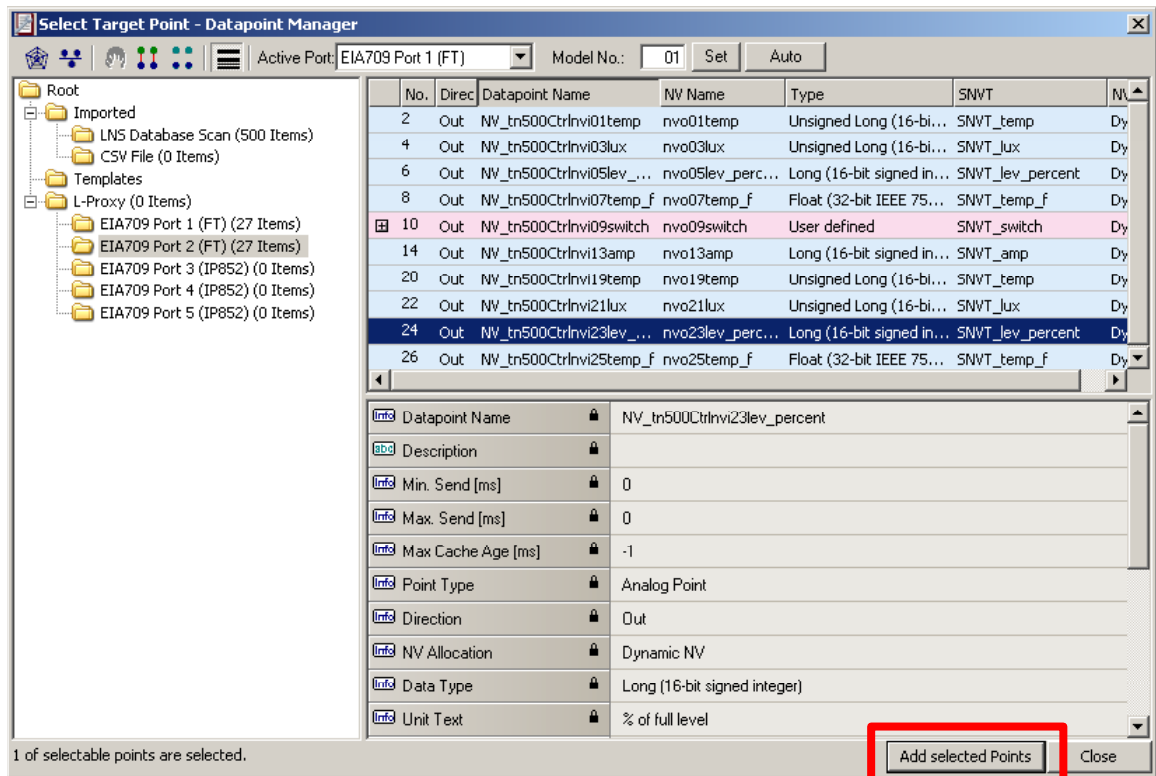


Figure 126: Select Targets in the Datapoint Manager.

Note, that by default only compatible NVs are displayed. NVs already in a connection are displayed in red.

Now the connection dialog contains a hub NV and one target NV as shown in Figure 127. Optionally, you may enter a connection name with a user friendly text. By default, the name of the hub point is used. Then click on “Save” to save the created connection.

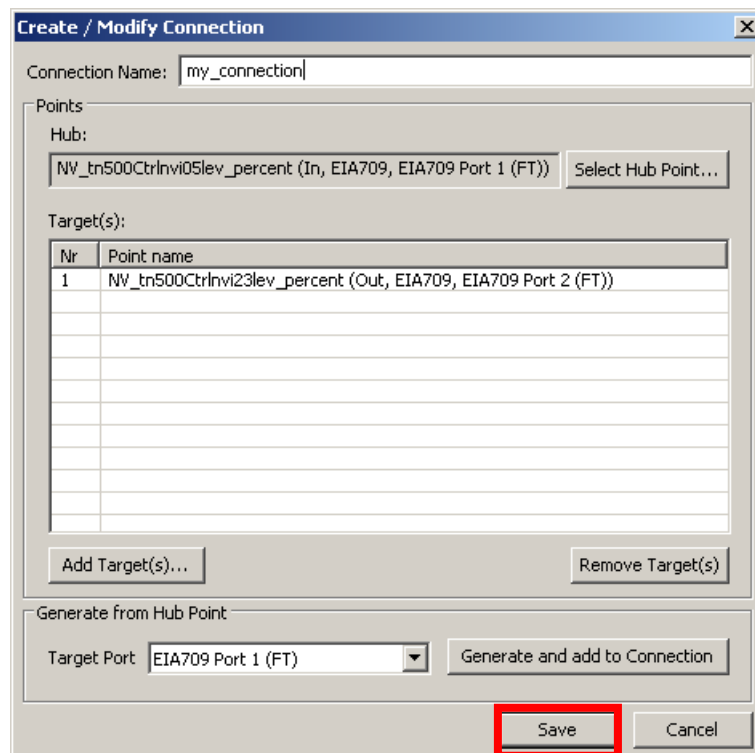


Figure 127: Connection dialog with hub and target points.

The main window of the L-Gateway configuration software shows the list of connections as shown in Figure 128. The new connection we have created contains nvi05lev_percent of Port 1 and nvo23lev_percent of Port 2.

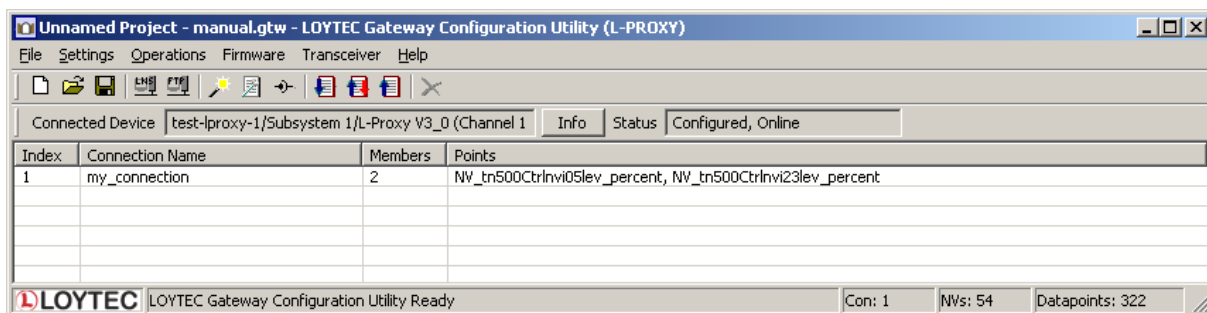
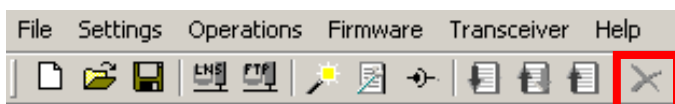


Figure 128: We have created a new connection inside L-Proxy.

Adding connections manually can be a lengthy process. Refer to Section 9.7.12 to learn how to create connections automatically.

9.7.10 Delete a connection

To delete a connection select the connection in the main window and select the “Delete connection” button



In the tool bar. Optionally, you may select the connection and hit the “Del” key on the key board. To delete multiple connections you can use the multi-select feature.

9.7.11 Edit a connection

To edit a connection double-click on the connection in the main window. This opens the “Create/Modify Connection” dialog as shown in Figure 129. When editing the connection, the user can select a different hub NV, add or delete target NVs. To delete a target, select the target and click on “Remove Target(s)”.

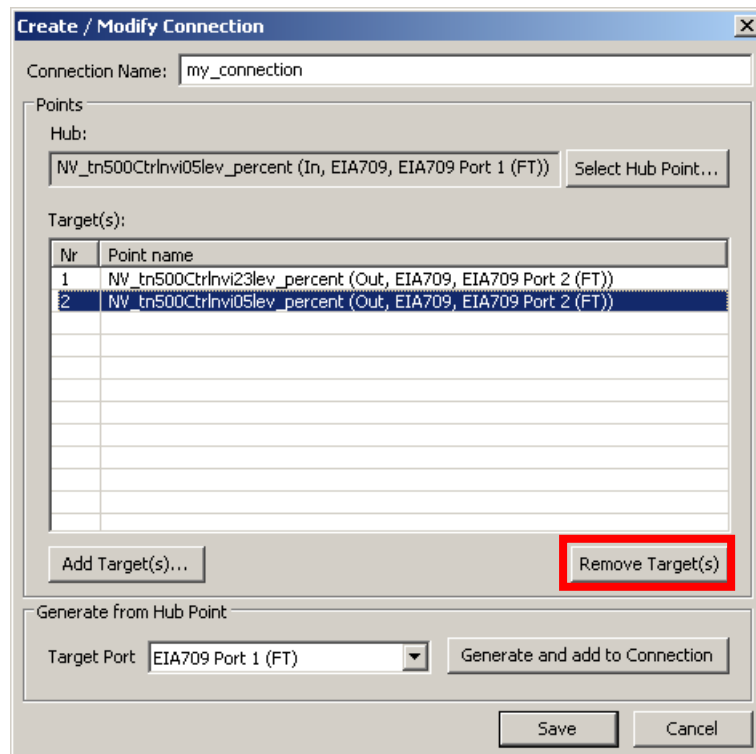


Figure 129: Delete a target from a connection.

9.7.12 Auto-connection

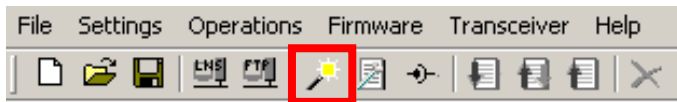
Creating internal connections in the L-Proxy manually is a slow process. The auto-connection feature provides a fast method to create connection for a large number of data points. To use this feature, one needs to take care when giving names to NVs. The auto-connect tool creates connections for all compatible input and output network variables that have the same name after the prefixes ‘nvi’ or ‘nvo’ have been removed from their names.

Here is an example:

For “nviTemp0” on port1, “nvoTemp0” on port 2 and “nvoTemp0” on port 3 a connection called nviTemp0 is created containing those three data points.

Note, that NVs are not required to be on different L-Proxy ports in order to be added to connections.

To run the auto-connect algorithm click on the “magic wand” button



in the tool bar.

Once connections are generated, the auto-connect feature can be re-applied as soon as new NVs are added. If they are compatible and their names match, they are added to existing connections.

9.7.13 Configuration Download

After the data points and connections have been configured, the configuration needs to be downloaded to the L-Proxy. To do so, the L-Proxy must be online. If the L-Proxy is not yet connected to the network, the configuration can be saved to a project file on the local hard drive.

For downloading the configuration, click on the “Download Configuration” button in the tool bar as indicated by Figure 130.

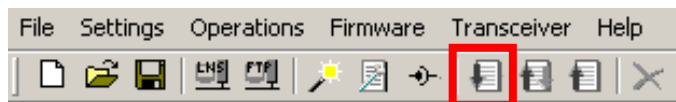


Figure 130: Select the download in the connections screen.

This will open the configuration download dialog as shown in Figure 131. If the NVs have been edited to be “Static NV” or “Dynamic NV”, the L-Gateway configuration software can create the bindings automatically. This is the default behavior. If no bindings shall be generated, deselect the “Automatically create bindings” checkbox indicated by the red rectangle in Figure 131. Further, if “Static NV” has been selected, a new model number for the L-Proxy port needs to be selected. This is necessary, as the static network interface of the port changes on the EIA-709 network. The L-Gateway configuration software automatically selects a usable value, which can be overridden in the field “Model Number” marked by the blue rectangle in Figure 131.

To start the download, press the “Start” button. Each of the actions is displayed in the “Task List” section of the dialog. The current progress is indicated by the progress bar below. When the download process has finished, a notification window appears, which has to be acknowledged by clicking “Ok”.

Configuration Download - EIA709 Port 1 (FT)

Target LNS AppDevice

Name: L-Proxy V3_0

Channel: Channel 1

Subnet: 1

Node: 84

Program ID: 9000D74600FF0402

Neuron ID: 80000001DF05

IP Address: 192.168.24.100

Firmware: 3.0.0

Model Number: 01 Generate Free

LNS Options

☒ Automatically create bindings

☐ Overwrite existing bindings

Task List

No	Task	Status
1	Download the configuration	
2	Cleanup old dynamic NWS	
3	Commission device	
4	Reboot the device	
5	Upgrade the Device	
6	Commission device	
7	Create bindings	
8	Register on new device template	

0%

Controls

Start Abort Close

Figure 131: Configuration Download Dialog

Note, that after the download is complete, the interface changes become active on all ports in the L-Proxy, not only the port, which has been used for the download. It is recommended to refresh the network management tool to reflect the changes made by the L-Gateway configuration software to the LNS database.

9.8 L-Proxy LonMark Objects

The L-Proxy has the LonMark objects as outlined in the following sections.

9.8.1 Node Object

The L-Proxy provides a node object conforming to the LonMark guidelines [1]. A diagram of the node object is depicted in Figure 132.

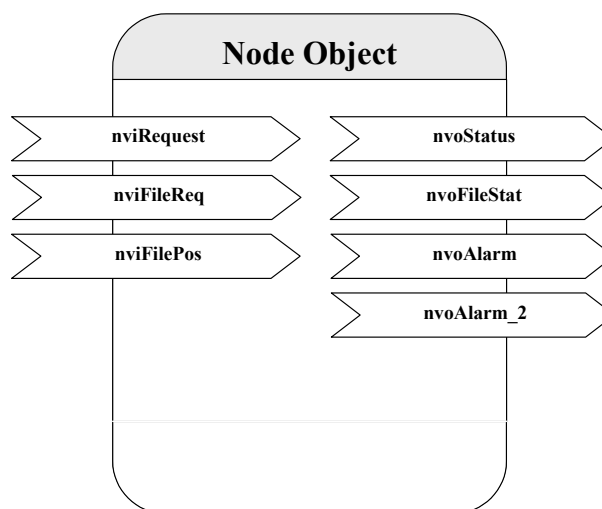


Figure 132: Node Object

Further the node object has the following configuration properties:

- ◆ SCPTmaxSndT (writeable)
- ◆ SCPTobjMajVer (constant)
- ◆ SCPTobjMinVer (constant)

The node object supports the following features:

- ◆ Supported commands via nviRequest:
 - RQ_NORMAL
 - RQ_UPDATE_STATUS
 - RQ_REPORT_MASK
 - RQ_ENABLE
 - RQ_DISABLE
 - RQ_UPDATE_ALARM
 - RQ_CLEAR_ALARM
 - RQ_RESET
 - RQ_CLEAR_RESET
- ◆ LonMark alarming is supported via nvoAlarm (SNVT_alarm) and nvoAlarm_2 (SNVT_alarm_2). This allows devices supporting the LonMark alarm notifier profile (e.g. i.LON 100) to receive alarms generated by the L-Proxy and react with a defined action (e.g. send an email). By supporting both alarm SNVTs, SNVT_alarm and SNVT_alarm_2, legacy and state-of-the-art alarm handling is supported.
- ◆ LonMark File Transfer including random access
- ◆ Max send time configuration property (heart beat)
- ◆ Object versioning
- ◆ Node versioning

Further it has the following manufacturer specific features:

- ◆ The L-Proxy provides the current value of the on-board temperature sensor.
- ◆ The L-Proxy provides the current value of the input voltage on the power supply.

9.8.2 Gateway Objects

The L-Proxy provides a total of eight Gateway objects, which are vendor-specific objects. Their object numbers are 1 through 8. Each Gateway object has the following configuration properties:

- ◆ SCPTobjMajVer (constant)
- ◆ SCPTobjMinVer (constant)

Each Gateway object does support the following requests:

- ◆ RQ_NORMAL: Enables the proxy object. If it was disabled a consistency check of the network variable relaying configuration is performed.
- ◆ RQ_UPDATE_STATUS: Updates node status network variable with current status of proxy object.
- ◆ RQ_REPORT_MASK: Reports status bits supported by proxy object (see below). Set report_mask to 1.

The purpose of the Gateway objects is to do network variable relaying and SNVT translation. Thus, the behavior of these objects is defined during the configuration phase by

- ◆ defining static and/or dynamic network variables,
- ◆ creating the connections between the network variables.

10 Application Scenarios

This chapter shows some networking scenarios that are typical applications for L-Proxy. Please note that only few scenarios are shown right now and this chapter will be continuously updated with new application areas.

10.1 Address Table Extension

L-Proxy can be used to expand the number of address table entries available in a standard node that uses a Neuron Chip. If more than 15 destination addresses are required by the application one can use L-Proxy to overcome this limitation. Also if the node is a member of more than 15 groups L-Proxy can help to remove this restriction.

10.1.1 Saving entries in the address table

Figure 133 shows a simple network diagram comprising three Neuron Chip powered nodes. Each node contains four LonMark objects: a node object, an actuator object and two sensor objects. The actuator object controls a lamp; the two sensor objects are connected to switches.

The two output network variables nvoSwitch0 on node 6 is bound to nviLampValue0 on node 7 and on node 8. The two bindings use up two entries in the address table.

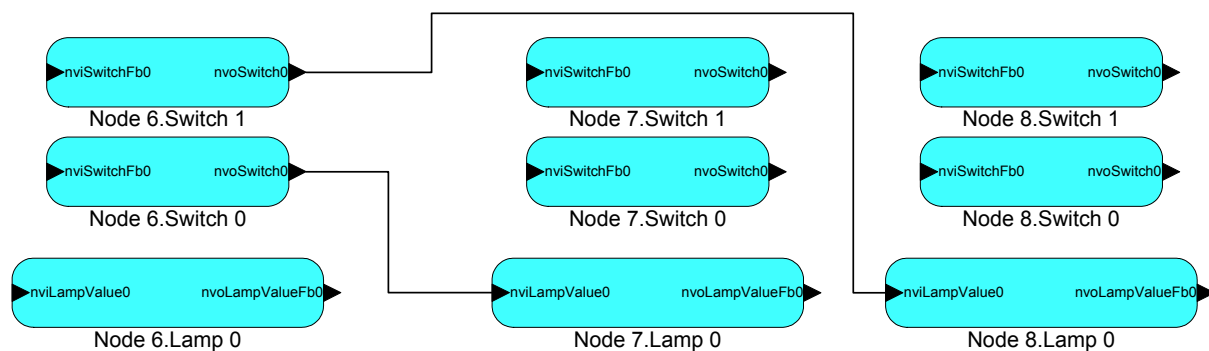


Figure 133: Two individual subnet/node addressed bindings use up two entries in the address table.

LPA on LPT1: LPA - [Active Log Running]									
File Profile Packet Window Help									
IF LM TR CE DE CQ									
Number	Time	Length	Flags	Tx#	Domain	Source	Destination	Service	Data
1	12:18:23.167057	19	-- -- ---	3	suitcasedemo2	Node 6	Node 7	ACKD	UPDT[Nv4 nvoSwitch0 (Switch 0)] C8 01
2	12:18:23.184337	15	-- -- ---	3	suitcasedemo2	Node 7	Node 6	ACK	
3	12:18:34.251892	19	-- -- ---	11	suitcasedemo2	Node 6	Node 8	ACKD	UPDT[Nv6 nvoSwitch0 (Switch 1)] C8 01
4	12:18:34.273206	15	-- -- ---	11	suitcasedemo2	Node 8	Node 6	ACK	

Figure 134: Protocol analyzer log file for the 2 subnet/node bindings shown in Figure 133. Node 6 first sends a packet to node 7 and then a packet to node 8.

L-Proxy can be used to make a single subnet/node addressed binding from the source node to L-Proxy. L-Proxy then completes the binding to the final destination nodes 7 and 8. In this case one entry in the address table was saved in the source node (node 6). Figure 135 shows the same network from above but now we added one port of L-Proxy (Port 2) to have a single destination address for node 6 thus saving an entry in the address table of node 6.

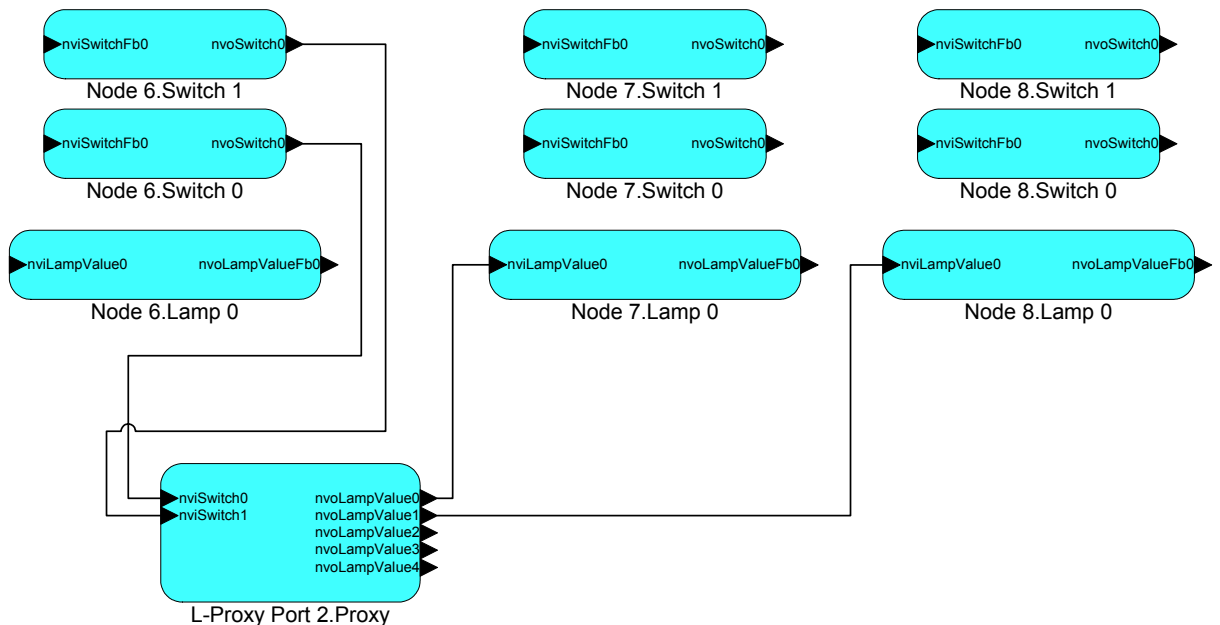


Figure 135: Node 6 only sends packet to L-Proxy Port 2 instead of sending message to nodes 7 and 8 directly. L-Proxy forwards the packet to the final destination nodes 7 and 8.

LPA on LPT1: LPA - [Active Log Running]									
File Profile Packet Window Help									
IF LM TR CF DF CQ									
Number	Time	Length	Flags	TxH	Domain	Source	Destination	Service	Data
1	13:40:12.323067	19	-- -- --	3	suitcasedemo2	Node 6	L-Proxy Port 2	ACKD	UPDT[Nv4 nvoSwitch0 (Switch 0)] C8 01
2	13:40:12.332616	15	-- -- --	3	suitcasedemo2	L-Proxy Port 2	Node 6	ACK	
3	13:40:12.365284	19	-- -- --	5	suitcasedemo2	L-Proxy Port 2	Node 7	ACKD	UPDT[Nv26 nvoLampValue0 ()] C8 01
4	13:40:12.377691	15	-- -- --	5	suitcasedemo2	Node 7	L-Proxy Port 2	ACK	
5	13:40:29.943536	19	-- -- --	5	suitcasedemo2	Node 6	L-Proxy Port 2	ACKD	UPDT[Nv6 nvoSwitch0 (Switch 1)] C8 01
6	13:40:29.955438	15	-- -- --	5	suitcasedemo2	L-Proxy Port 2	Node 6	ACK	
7	13:40:29.986763	19	-- -- --	7	suitcasedemo2	L-Proxy Port 2	Node 8	ACKD	UPDT[Nv27 nvoLampValue1 ()] C8 01
8	13:40:29.997488	15	-- -- --	7	suitcasedemo2	Node 8	L-Proxy Port 2	ACK	
Log: Running On-line FT-10 Packets: 20/20 CRC-Err: 0 Lost: 0									

Figure 136: Protocol analyzer log file for the 2 subnet/node bindings shown in Figure 135. Node 6 first sends an update for nviSwitch0 to L-Proxy, which sends an update to node 7. Next node 6 sends an update for nviSwitch1 to L-Proxy, which send an update to node 8.

The following Figure 137 shows the L-Proxy internal bindings required to fulfill the application shown in Figure 135. The first entry connects the input network variable nviSwitch0 on Port 2 to the output network variable nvoLampValue0 also in Port 2. The second entry connects the input network variable nviSwitch1 on Port 2 to the output network variable nvoLampValue1 also in Port 2. Note that these internal bindings are not visible within NL-220, LonMaker or Alex and cannot be seen with a protocol analyzer on the network.

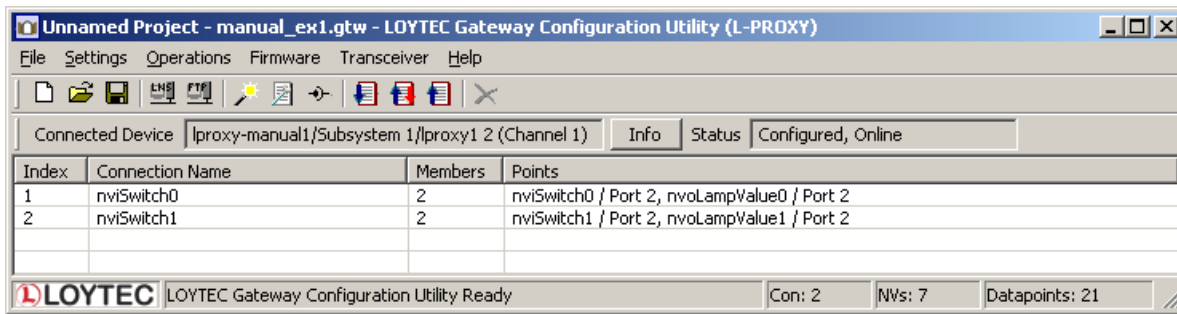


Figure 137: L-Proxy internal binding for the network shown in Figure 135.

10.1.2 Saving a group address

Figure 138 shows a simple network diagram comprising three Neuron Chip powered nodes. Each node contains four LonMark objects: a node object, an actuator object and two sensor objects. The actuator object controls a lamp, the two sensor objects are connected to switches.

The output network variable nvoSwitch0 on node 6 is bound to the input network variables nviLampValue0 on nodes 7 and 8. In this case NL-220 and LonMaker create a group with the 3 group members Node 6, Node 7, and Node 8. Figure 139 shows the log file from a protocol analyzer that clearly shows the acknowledged service using group addressing.

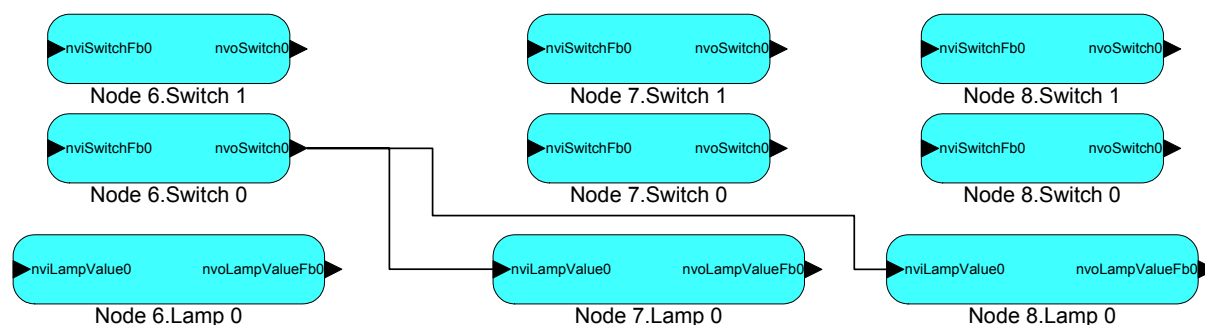


Figure 138: Acknowledged group binding between nodes 6, 7, and 8.

Number	Time	Length	Flags	TX#	Domain	Source	Destination	Service	Data
1	11:14:33.562422	18	-- -- --	0	suitcasedemo2	Node 6	#01	ACKD	UPDT (Nv4 nvoSwitch0 (Switch 0)) C8 01
2	11:14:33.586827	17	-- -- --	0	suitcasedemo2	Node 7/#01/01	Node 6	ACK	
3	11:14:33.592473	17	-- -- --	0	suitcasedemo2	Node 8/#01/02	Node 6	ACK	

Figure 139: Protocol analyzer log file for the group binding shown in Figure 138. Node 6 uses acknowledged group binding to communicate with nodes 7 and 8.

L-Proxy can be used to break up the group into individual subnet/node addressed bindings, which saves valuable group addresses for group bindings with a higher member count. Figure

140 shows the same network from above but now we have added one port of L-Proxy (Port 2) to break up the group into individual subnet/node addressed messages.

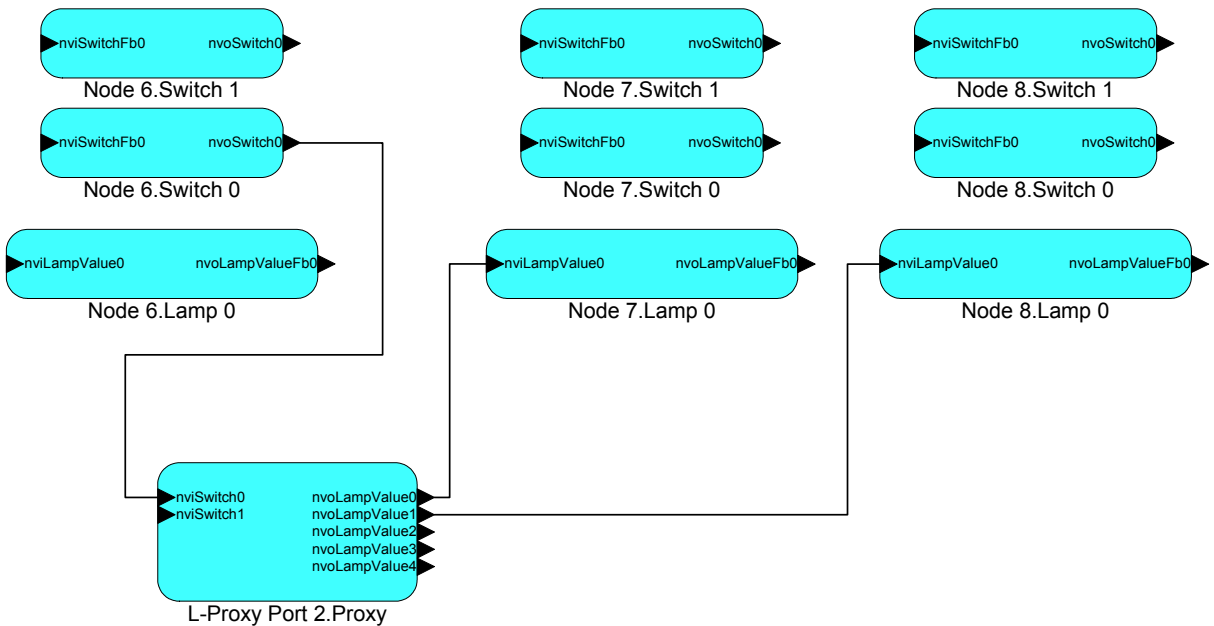


Figure 140: Acknowledged subnet/node addressed messages save a group address entry.

Number	Time	Length	Flags	TX#	Domain	Source	Destination	Service	Data
1	10:57:30.690129	19	-- -- --	15	suitcasedemo2	Node 6	L-Proxy Port 2	ACKD	UPDT[Nv4 nvoSwitch0 (Switch 0)] C8 01
2	10:57:30.700182	15	-- -- --	15	suitcasedemo2	L-Proxy Port 2	Node 6	ACK	
3	10:57:30.787976	19	-- -- --	7	suitcasedemo2	L-Proxy Port 2	Node 7	ACKD	UPDT[Nv26 nvoLampValue0 {}] C8 01
4	10:57:30.797862	19	-- -- --	8	suitcasedemo2	L-Proxy Port 2	Node 8	ACKD	UPDT[Nv27 nvoLampValue1 {}] C8 01
5	10:57:30.805731	15	-- -- --	8	suitcasedemo2	Node 8	L-Proxy Port 2	ACK	
6	10:57:30.809324	15	-- -- --	7	suitcasedemo2	Node 7	L-Proxy Port 2	ACK	

Figure 141: Protocol analyzer log file for the L-Proxy bindings shown in Figure 140. Node 6 uses acknowledged subnet/node binding to communicate with L-Proxy port 2. L-Proxy relays the information to nodes 7 and 8 using acknowledged subnet/node addressed messages.

The following Figure 142 shows the L-Proxy internal bindings required to fulfill the application shown in Figure 140. The entry connects the input network variable nviSwitch0 on Port 2 to the output network variables nvoLampValue0 through nvoLampValue4 on Port 2. One can see that in this configuration the input network variable nviSwitch0 is actually connected to 5 identical output network variables named nvoLampValue0-4. Therefore up to five destination nodes could be bound to the 5 output network variables on L-Proxy. Note that these internal bindings are not visible within NL220/LonMaker/Alex and cannot be seen with a protocol analyzer on the network.

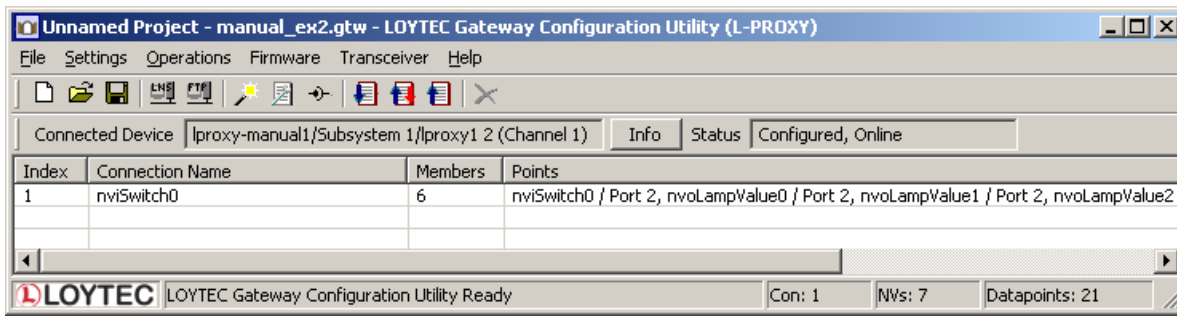


Figure 142: L-Proxy internal binding for the network shown in Figure 140.

10.2 Binding across Domains

Let's assume the network configuration from Table 7. We have 3 nodes Node 6, Node 7, and Node 8, which reside in three different domains. Each of the three nodes has a switch and a lamp object. The switch object is controlled by a switch connected to the node and the lamp object turns on and off a lamp.

Node name	NV name	Domain	Comment
Node 6	NvoSwitch0	4C4F59544543	SNVT_switch output NV
Node 6	NviLampValue0	4C4F59544543	SNVT_switch input NV
Node 7	NvoSwitch0	03	SNVT_switch output NV
Node 7	NviLampValue0	03	SNVT_switch input NV
Node 8	NvoSwitch0	505859	SNVT_switch output NV
Node 8	NviLampValue0	505859	SNVT_switch input NV

Table 7 Network configuration that spans 3 domains.

Let's assume that Node 6 in Domain 4C4F59544543 ("LOYTEC") must turn on the lamp connected to Node 7 in Domain 03 and the lamp connected to Node 8 in Domain 505889 ("PXY"). Furthermore the switch connected to Node 8 must turn on the lamp connected to Node 6 in Domain 4C4F59544543.

This would require a binding across domains, which is not supported in state-of-the-art network installations tools. One can use L-Proxy to make the connections between the 3 domains as explained below.

Lets add L-Proxy1 Port 2 to the network with DomainID 4C4F59544543 as shown in Figure 143. Next we have to create the dynamic input and output network variables on L-Proxy Port 2. Now we can bind the output NV nvoSwitch0 on Node 6 to the corresponding input NV nviSwitch0 on L-Proxy Port 2. We also bind the input NV nviLampValue0 on Node 6 to the output NV nvoLampValue0 on L-Proxy Port 2.

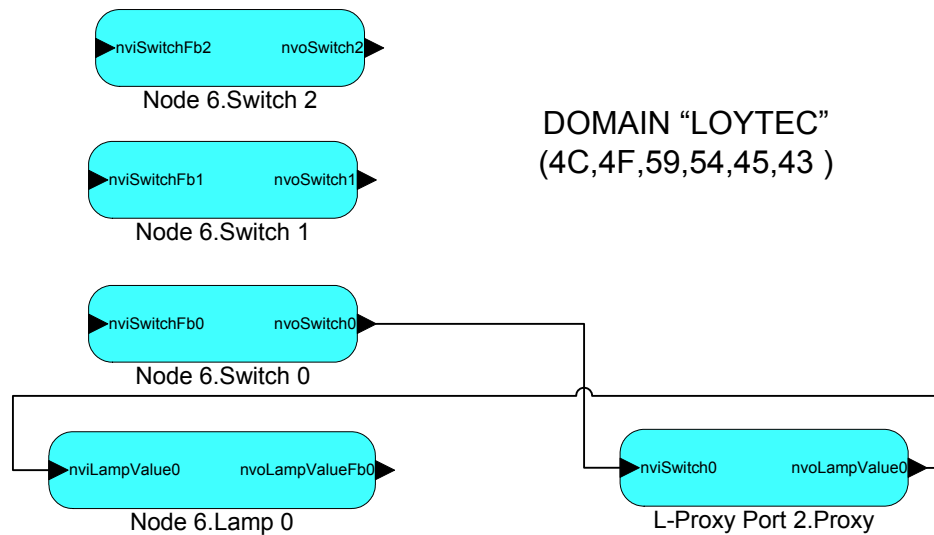


Figure 143: We bind the input and output NVs of Node 6 in domain 4C4F59544543 to the corresponding dynamically created NVs on L-Proxy Port 2.

Let's do similar bindings for the NVs on Node 7 and Node 8 as shown in Figure 144 and Figure 145. for L-Proxy Ports 3 and 4.

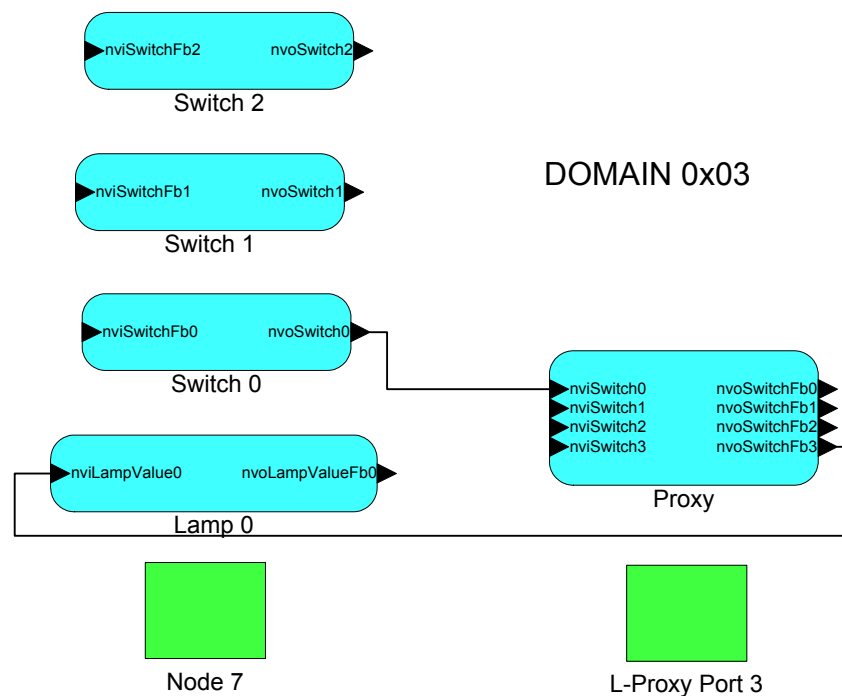


Figure 144: We bind the input and output NVs of Node 7 in domain 03 to the corresponding dynamically created NVs on L-Proxy Port 3.

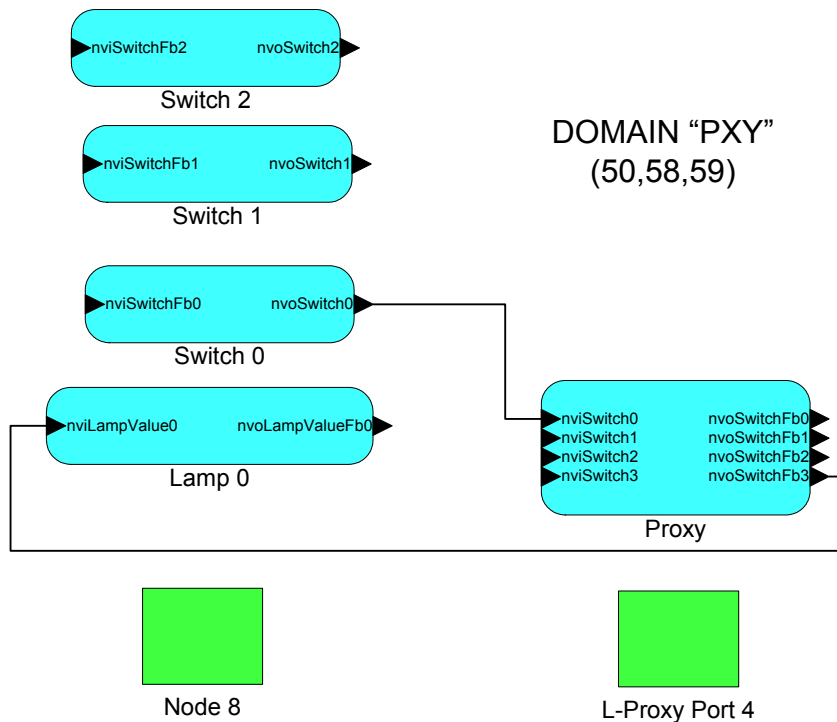


Figure 145: We bind the input and output NVs of Node 8 in domain 505859 to the corresponding dynamically created NVs on L-Proxy Port 4.

After extracting the port interface definitions for L-Proxy Ports 2-4 we can now create the Connections with the L-Proxy configuration utility. The results are shown in Figure 146. The first connection connects the switch on Node 6 (Port 2) with the lamp on Nodes 7 (Port 3) and 8 (Port 4). The second connection connects the switch on Node 8 (Port 4) with the lamp on Node 6 (Port 2).

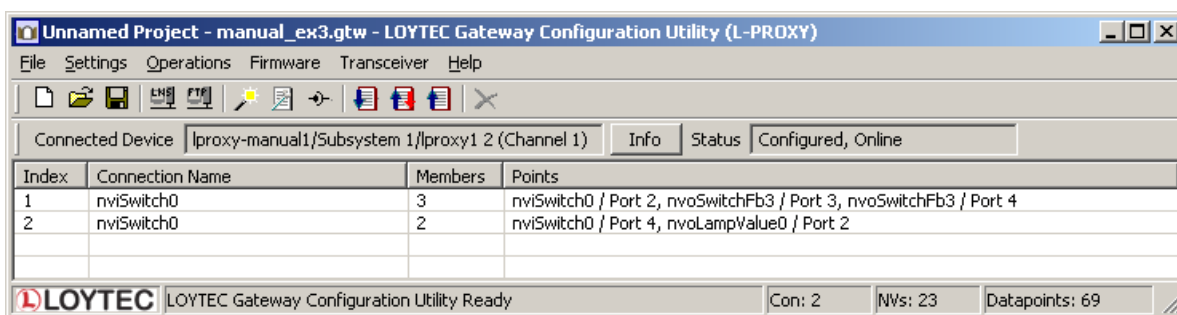


Figure 146: These 2 connections implement the desired functionality as specified: Node 6 in Domain 4C4F59544543 ("LOYTEC") must turn on the lamp connected to Node 7 in Domain 03 and the lamp connected to Node 8 in Domain 505889 ("PXY"). Furthermore the switch connected to Node 8 must turn on the lamp connected to Node 6 in Domain 4C4F59544543.

If we now flip the switch on Node 6 the protocol analyzer log file will show the results from Figure 147.

Packet #1: NV update sent from nvoSwitch0 on Node 6 to L-Proxy Port 2 nviSwitch0.

Packet #2: L-Proxy Port 2 sends an acknowledgement back to Node 6 in domain 4C4F59544543.

Packet #3: L-Proxy Port 3 forwards the NV update from “Node 6 nvoSwitch0” to Node 7 in domain 03.

Packet #4: L-Proxy Port 4 forwards the NV update from “Node 6 nvoSwitch0” to Node 8 in domain 505859.

Packet #5: Node 7 sends an acknowledgement back to L-Proxy Port 3.

Packet #6: Node 8 sends an acknowledgement back to L-Proxy Port 4.

Number	Time	Length	Flags	TX#	Domain	Source	Destination	Service	Data
1	+00.000000	19	-- -- --	10	4C4F59544543	0A/0D	0A/0E	ACKD	UPDT[01BF] C8 01
2	+00.005429	15	-- -- --	10	4C4F59544543	0A/0E	0A/0D	ACK	
3	+00.003339	14	-- -- --	8	03	01/0A	01/08	ACKD	UPDT[0357] C8 01
4	+00.002899	16	-- -- --	9	505859	01/03	01/01	ACKD	UPDT[008E] C8 01
5	+00.013063	10	-- -- --	8	03	01/08	01/0A	ACK	
6	+00.004617	12	-- -- --	9	505859	01/01	01/03	ACK	

Log: Running On-line FT-10 Packets: 6/6 CRC-Err: 0 Lost: 0

Figure 147: Turning on the switch on Node 6 creates the following packet stream in order to turn on the lamps on Node 7 and Node 8.

The second part of our desired network communication is shown in Figure 148. When we flip the switch on Node 8 the lamp on Node 6 should turn on. The following packet streams can be seen on a protocol analyzer log output.

Packet #1: NV update sent from nvoSwitch0 on Node 8 to L-Proxy Port 4 nviSwitch0.

Packet #2: L-Proxy Port 4 sends an acknowledgement back to Node 8 in domain 505859.

Packet #3: L-Proxy Port 2 forwards the NV update from “Node 8 nvoSwitch0” to Node 6 in domain 4C4F59544543.

Packet #4: Node 6 sends an acknowledgement back to L-Proxy Port 2.

Number	Time	Length	Flags	TX#	Domain	Source	Destination	Service	Data
1	+00.000000	16	-- -- --	3	505859	01/01	01/03	ACKD	UPDT[0138] C8 01
2	+00.007643	12	-- -- --	3	505859	01/03	01/01	ACK	
3	+00.004038	19	-- -- --	12	4C4F59544543	0A/0E	0A/0D	ACKD	UPDT[00A5] C8 01
4	+00.019994	15	-- -- --	12	4C4F59544543	0A/0D	0A/0E	ACK	

Figure 148: Turning on the switch on Node 8 creates the following packet stream in order to turn on the lamp on Node 6.

Note, in this example the 3 L-Proxy ports can either be connected to the same network cable (as shown in the log file in Figure 147) or they can be connected to individual network cables.

10.3 Poll-Update Proxy

Let's assume a scenario with a node that cannot send updates by itself and must be polled instead. On the other hand the destination of the information e.g. a SCADA system or OPC server cannot poll but must receive updates. The input NVs on the L-Proxy can then be configured to actively poll the source node at a defined poll cycle and the updates are sent to the destination node.

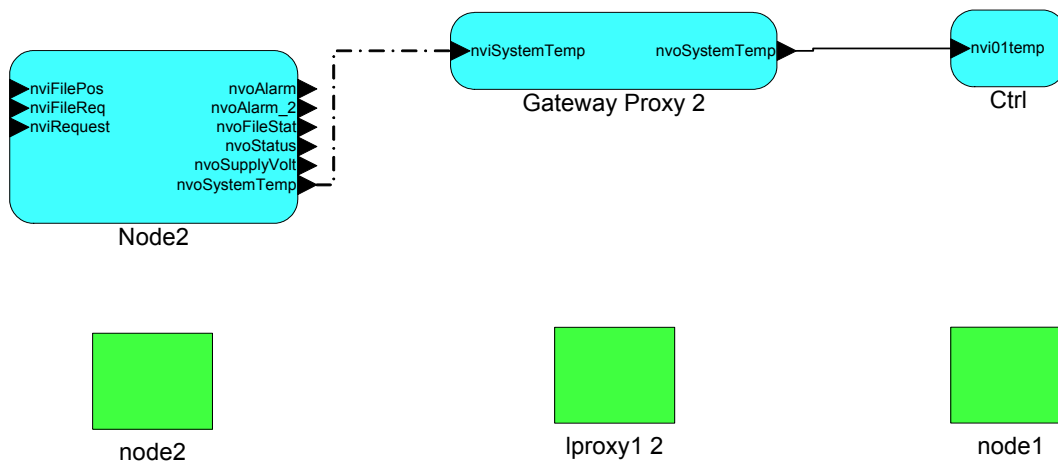


Figure 149: Active poll of nvoSystemTemp on node2 from nviSystemTemp on node lproxy1 2.

In our example the output network variable nvoSystemTemp on node 'node2' in Figure 149 cannot send updates by itself but must be polled. In our case the lproxy1 2 polls this output network variable with the input nviSystemTemp using a poll cycle of 30s as defined in the data point manager dialog (see Figure 150).

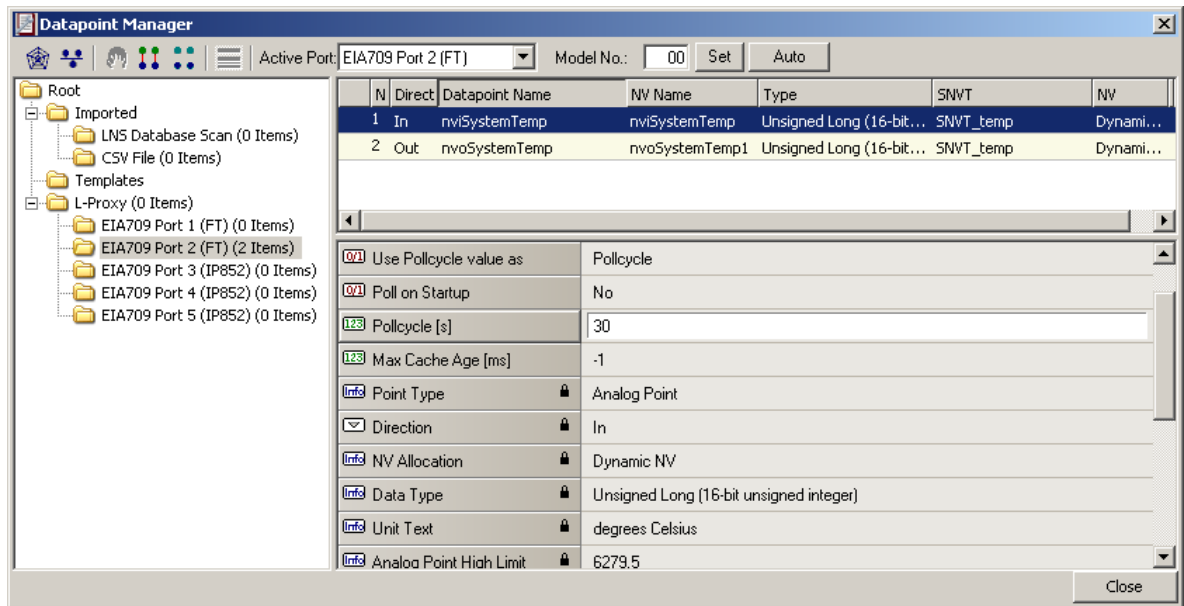


Figure 150: Poll cycle setting for input nviSystemTemp on node lproxy1 2

In this example lproxy1 2 sends an update out on nvoSystemTemp when the polled value changes. If the 30s are too long in some circumstances, a forward poll can be configured. Forward poll means that if poll requests are received from the destination node (node1) on the output side of L-Proxy, they are forwarded to the source node (node2) in addition to the periodic polls generated by the L-Proxy. To configure a forward poll set the Max Cache Age property to '0' as shown in Figure 151.

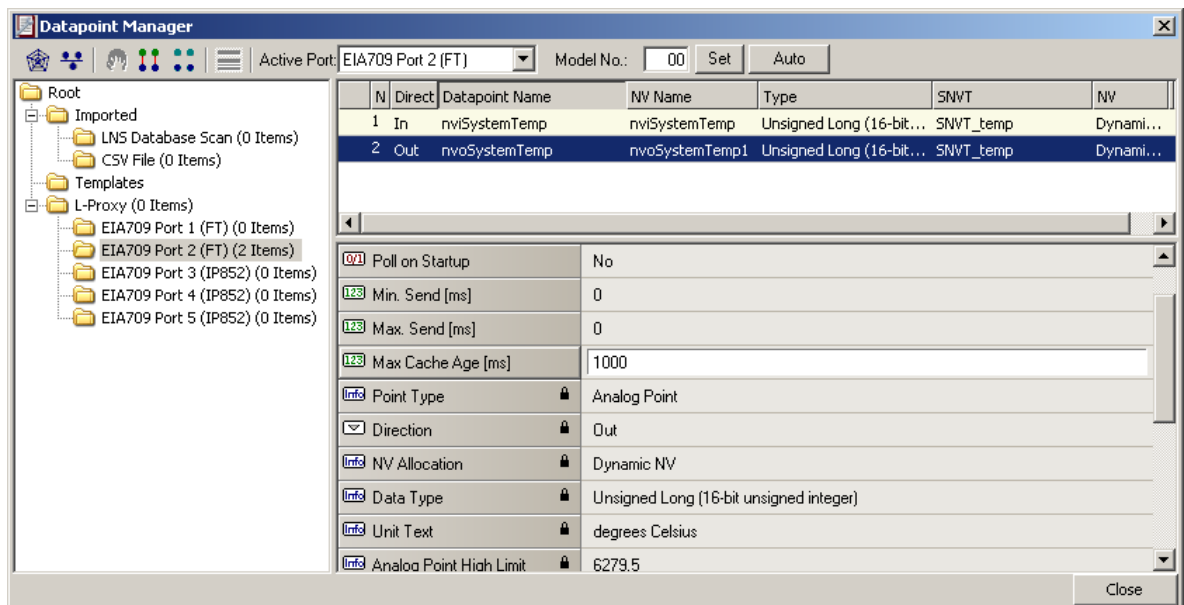


Figure 151: Max Cache Age setting for nvoSystemTemp on node lproxy1 2

10.4 Poll-On-Startup Proxy

Some scenarios require that at power-up or after a reset the network variable values from the source node should be polled once to obtain the current state of these network variables. In

the L-Gateway configuration software a poll-on-startup flag can be set for each individual input NV. An example is shown in Figure 152. The rate for sending poll-on-startup polls is automatically adjusted to not saturate the network channel.

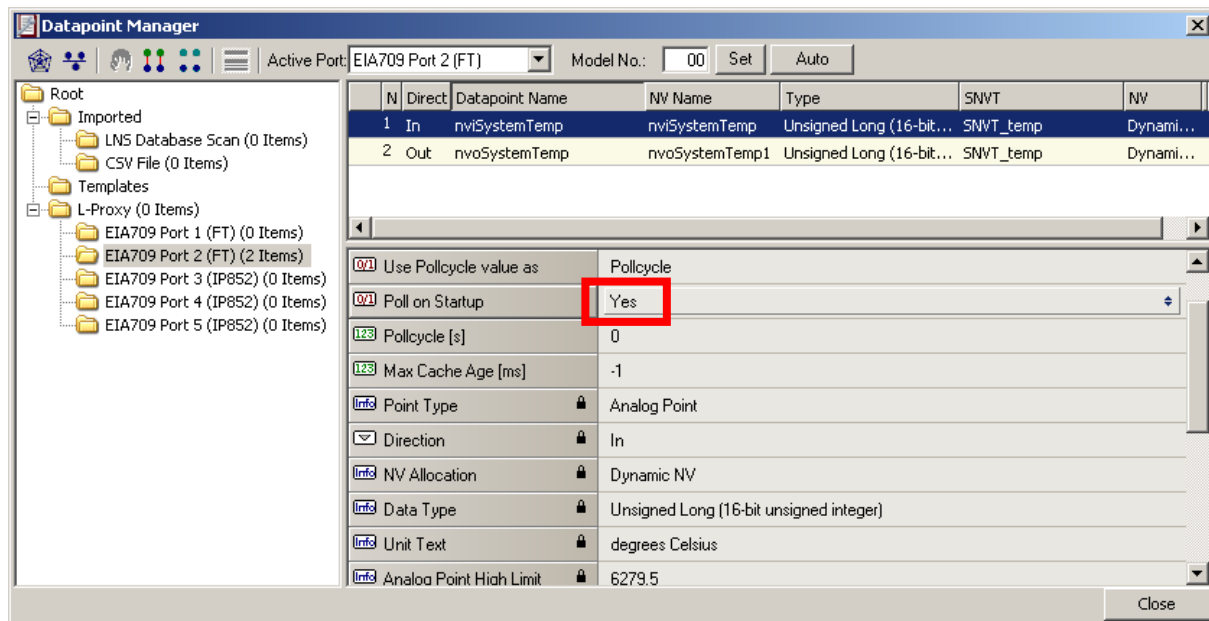


Figure 152: The poll-on-startup flag is set for this input NV.

10.5 SNVT Translation

The L-Proxy can generate connections containing data points of the same class (e.g., analog points). See also Section 8.1.2. This feature can be used to convert between different scalar SNVTs, which is often referred to as “SNVT translation”.

The example in Figure 153 shows a node 1 that has network variables nvoAmpere of SNVT_amp and nvoTemperature of SNVT_temp. It also shows a node 2 with network variables nviAmpere_mil of SNVT_amp_mil and nviTemperature_f of SNVT_temp_f. Since the network variables are of different type on node 1 and on node2 these NVs cannot be bound directly. The L-Proxy can act as a translator between the different network variable types as shown in Figure 153.

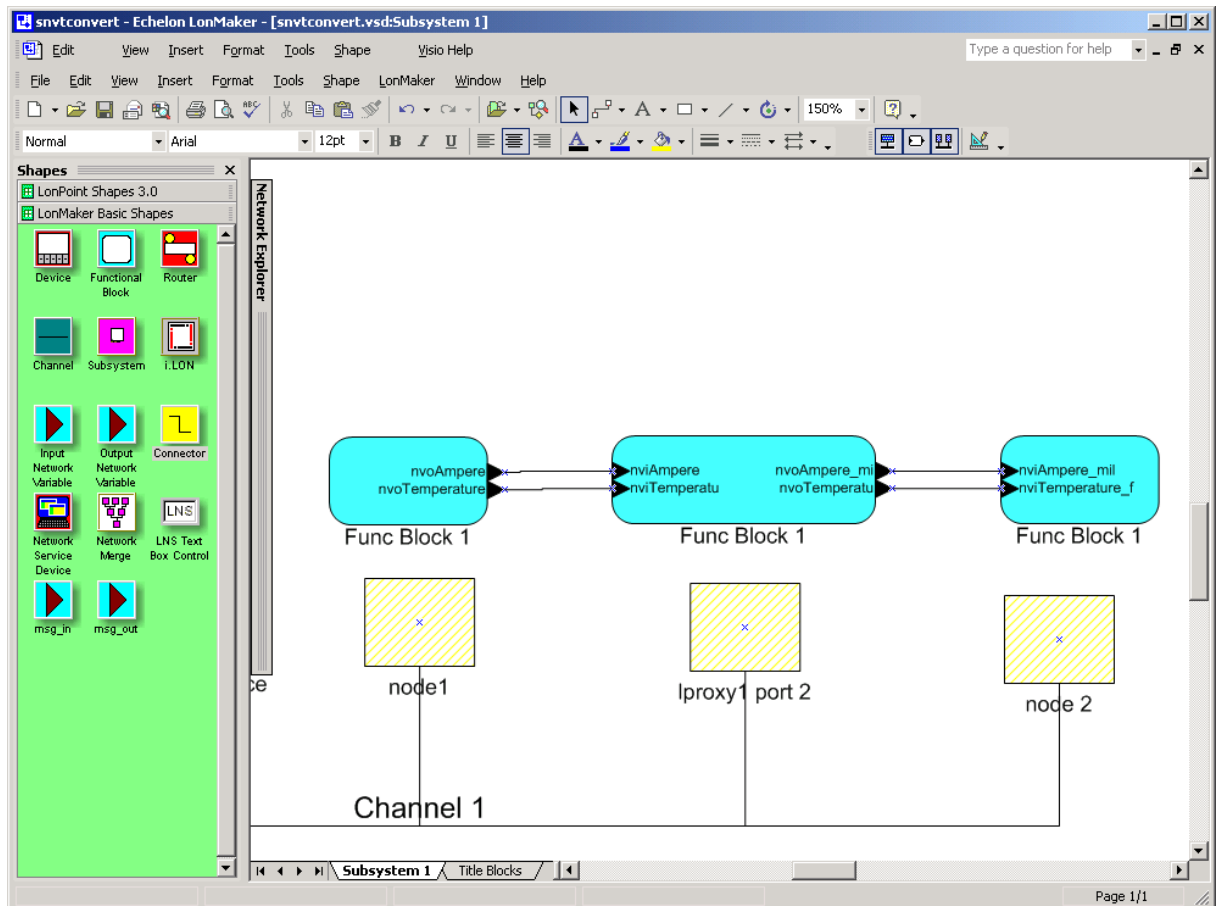


Figure 153: Example for scalar SNVT translation.

Create a manual connection for nviAmpere and nvoAmpere_mil on L-Proxy port 2 (see Section 9.7.9). An example connection dialog for this is shown in Figure 154.

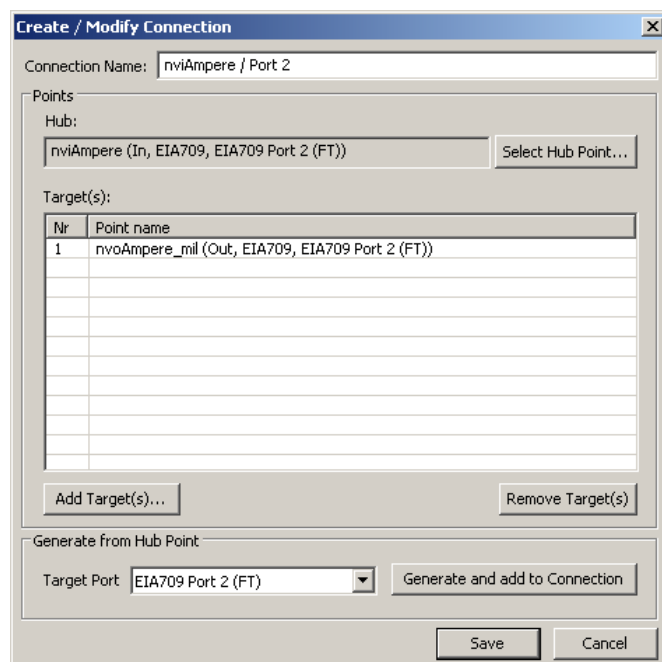


Figure 154: Connection dialog to set up SNVT translation.

Now repeat the same steps for the second network variable of type SNVT_temp and SNVT_temp_f. You will end up with two connections as depicted in Figure 155.

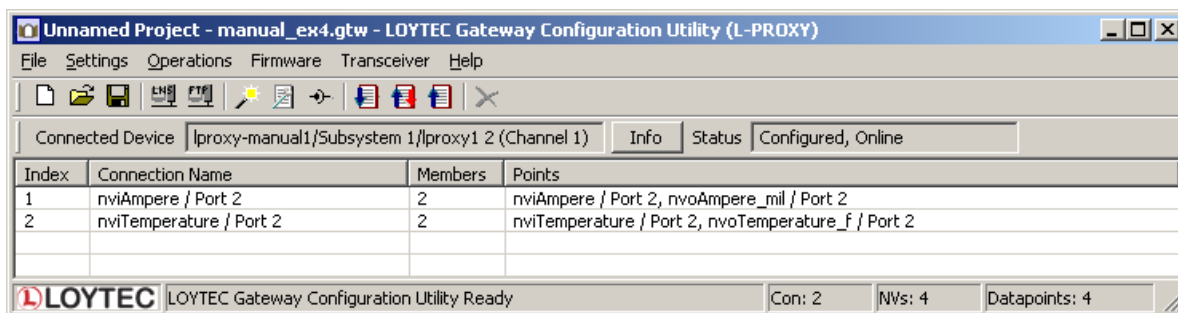


Figure 155 The two connections convert between the different network variable types used in the example in Figure 153.

11 L-Proxy Firmware Update

The L-Proxy firmware supports remote upgrade over the network and the serial console.

To guarantee that the L-Proxy is not destroyed due to a failed firmware update, the L-Proxy firmware consists of two images:

1. L-Proxy fallback image,
2. L-Proxy primary image.

The L-Proxy fallback image cannot be changed. Thus, if the update of the primary image fails or the image is destroyed by some other means, the fallback image is booted and allows to reinstall a valid primary image.

11.1 Firmware Update via FTP

The L-Proxy primary image can be updated using any FTP client. For this purpose, the L-Proxy must be connected to the Ethernet and must have a valid IP configuration (see Section 5.6 and 6.2.2).

The following instructions explain how to update the firmware using the command line FTP client of Windows. However, the process can be accomplished using any other FTP client.

1. Start the command shell (Start->Run, enter "cmd" in the field "Open", press OK).
2. Change to the directory containing the firmware image ("lproxy_lc3k_primary.dl"). Use the command "cd".
3. Start the ftp client. Type "ftp <ip-addr>", where <ip-addr> is the IP address of the L-Proxy.
4. When asked for the user enter "admin".
5. When asked for the password enter the password for the "admin" user. The default password is "admin". It can be changed via the Web interface (see Section 6.1) and reset via the console UI (see Section 5.8.2).
6. Switch to binary mode by entering "binary".
7. Upload the firmware image to the directory "dev" with the command "put lproxy_lc3k_primary.dl dev/lproxy_lc3k_primary.dl".
8. After the firmware image has been successfully uploaded, the L-Proxy automatically reboots.
9. Leave the ftp client with the command "quit".

The complete output should look like shown in Figure 156.

```
C:\temp>ftp 192.168.1.254
Connected to 192.168.1.254.
220 RTEMS FTP server (Version 1.1-JWJ) ready.
User (192.168.1.254:(none)): admin
331 User name okay, need password.
Password:
230 User logged in.
ftp> binary
200 Type set to I.
ftp> put lproxy_lc3k_primary.dl dev/lproxy_lc3k_primary.dl
200 PORT command successful.
150 Opening BINARY mode data connection.
226 Transfer complete.
FTP: 64d Bytes sent in 7,63seconds 88,83KB/s
ftp> quit
```

Figure 156: Typical output of the command line FTP client during a firmware update.

11.2 Firmware Update via the Console

To download the firmware via the console interface, the L-Proxy must be connected to the RS-232 port of a PC via its console interface as described in Section 5.1. You will need the LOYTEC serial upgrade tool (LSU Tool), which can be downloaded from our homepage at www.loytec.com.

Please make sure that the L-Proxy console shows the main menu. Otherwise navigate to the main menu or simply reset the L-Proxy.

Double click on the *.dlc file that comes with the new firmware package. This should start the LSU Tool and load the firmware image referenced in the dlc file. Please note that the dlc file and the dl file must be stored in the same folder. The start window of the LSU tool is shown in Figure 157.

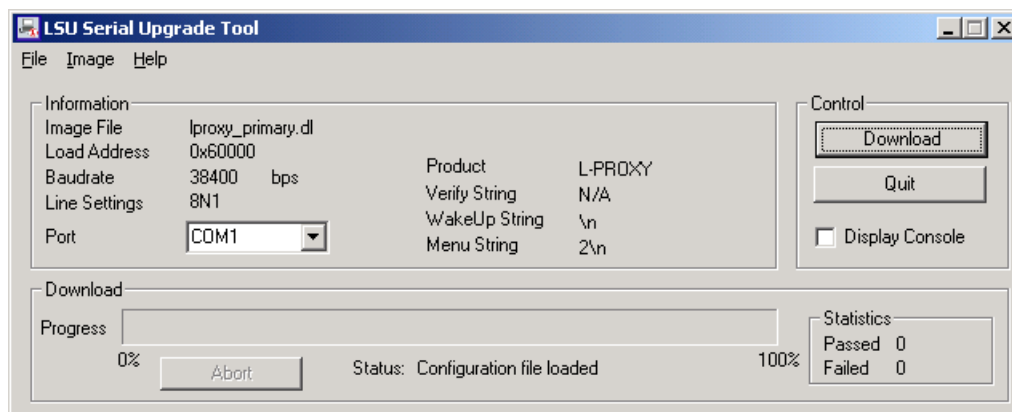


Figure 157: LSU Serial Upgrade Tool in Idle Mode

If the L-Proxy is not connected to COM1 you can change the port to COM2, COM3, or COM4. Make sure that the product shown under “Product” matches the device you are upgrading. Press “Download” to start the download. A progress bar as shown in Figure 158 can be seen.

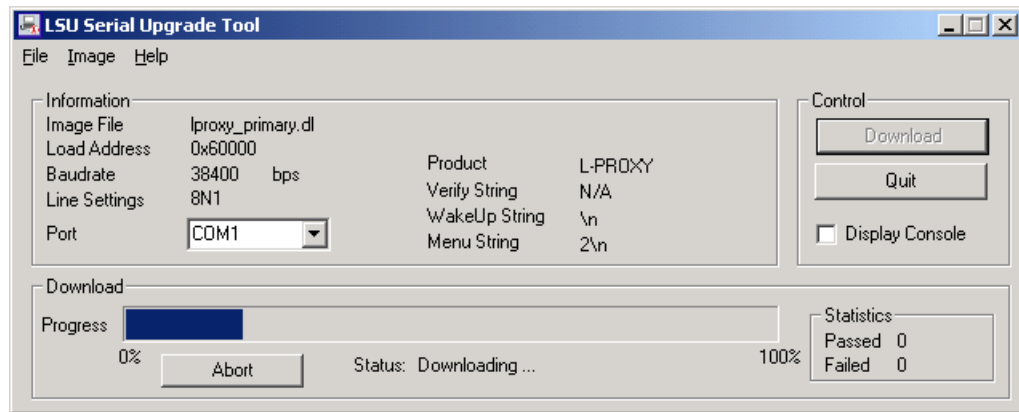


Figure 158: Progress Bar during Firmware Download.

If the upgrade is successful, the following window appears (Figure 159).

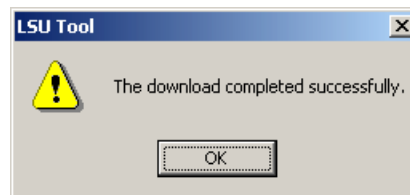


Figure 159: Successful Firmware Upgrade

Double-check that the new firmware is executed in the device information menu on the console. This will bring up the device information which shows the current firmware version (see Section 5.3.1).

11.3 Firmware Update via the EIA-709 Network

Basically, firmware downloads can be performed on every L-Proxy port. However, since the L-Proxy is not based on a Neuron Chip, a new firmware image cannot be downloaded with a standard tool. Rather, a designated tool, the LSD Tool (see Section 14.1), must be used. See the LSD Tool documentation for details on how to download a new L-Proxy firmware via the EIA-709 network.

12 File Formats

12.1 NV Import File

Network variables can be imported into the L-Gateway configuration software in a CSV file. The format of this file is described in this section.

The first line of the file must contain a comment, starting with a hash character '#' specifying the format version and import technology:

```
#dpal_csv_config;Version=1;Technology=EIA709
```

After that line any number of comment lines starting with a hash character '#' are allowed. Lines that are not comments specify one NV per line, using the column information as described in Table 8. The columns are separated by commas ',' or semi-colons ';'.

Column	Field	Example	Description
A	SNVT	39	A numeric value of the SNVT (as defined in the SNVT master list). The example value 39 represents a SNVT_temp.
B	NV index	0	The NV index in decimal of the NV on the network node. Indices start at 0.
C	NV selector	1	The NV selector in decimal of the NV on the network node.
D	NV name	nvoTemp	The NV programmatic name of the NV on the network node.
E	is output	1	Defines if this NV is an output on the network node. '1' means the NV is an output on the network node.
F	flag auth cfg	1	'1' defines that authentication can be configured for this NV on the network node.
G	flag auth	0	'1' defines that the NV is authenticated.
H	flag priority cfg	1	'1' defines that the priority can be configured for this NV on the network node.
I	flag priority	0	'1' defines that the NV is using priority.
J	flag servicetype cfg	1	'1' defines that the service type can be configured for this NV on the network node.
K	flag service ack	1	'1' defines that the NV is using acknowledged service.
L	flag polled	0	'1' defines that the NV is using the polled attribute
M	flag sync	0	'1' defines that the NV is a synchronous NV.
N	deviceref	1	This field is a numeric reference to a device description. If it is the first occurrence of this reference in the file, the columns defined below must be filled in. Otherwise,

			they can be left out.
O	programID	9000A44850060402	The program ID string of the network device.
P	neuronID	80000000C8C8	The NID of the network device.
Q	subnet	2	The subnet address of the network device. Use '0' if the device has no subnet address information.
R	node	3	The node address of the network device. Use '0' if the device has no node address information.
S	location str	0	The location string of the network device. Use '0' if no information is available.
T	devicename	DDC	The device name of the network device. Leave this field blank if this information is not available.

Table 8: CSV Columns of the NV Import File

13 Troubleshooting

13.1 All port LEDs are flashing red

Problem

All port LEDs are flashing red at a rate of approximately once per second and the L-Proxy does not relay messages.

Explanation

Somehow the primary image was destroyed and the fall-back image was booted (see Section 11). This image does not support relaying messages. It only allows downloading a new firmware.

Solution

If this problem occurs because a firmware update was attempted (and failed somehow), simply retry downloading the new firmware image.

If no firmware update was attempted, please contact LOYTEC support (see Section 13.7).

13.2 LonMaker Warning appears during installation

Problem

When adding a new L-Proxy Port to the project the following warning messages might appear.

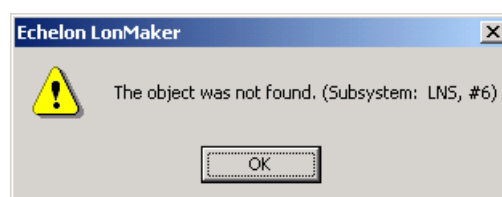


Figure 160 Click OK to continue.

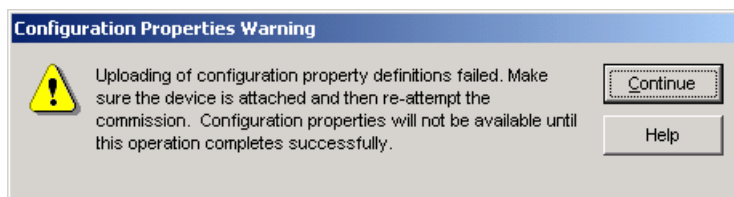


Figure 161 Click on Continue.

Explanation

There are still some dynamically created NVs in L-Proxy. This can happen if the node has been used in a different project and it hasn't been de-commissioned in the old project before it was moved to the new network.

Solution

Click on Yes and Continue. In most cases this will be enough to use L-Proxy. If L-Proxy is behaving strange one should reset the L-Proxy to its default configuration via the console interface (see Section 5.8).

13.3 NL220 Warning appears during installation

Problem

When adding a new L-Proxy Port to the project the following warning messages might appear.

```
Creating node <L-Proxy1 Port2> ...  
Node successfully created.  
Uploading configurations of <L-Proxy1 Port2> ...  
Lca : The object was not found. (Subsystem: LNS, #6)
```

Figure 162 Warning when creating node

Explanation

There are still some dynamically created NVs in L-Proxy. This can happen if the node has been used in a different project and it hasn't been de-commissioned in the old project before it was moved to the new network.

Solution

Ignore the error. In most cases this will be enough to use L-Proxy. If L-Proxy is behaving strange one should reset the L-Proxy to its default configuration via the console interface (see Section 5.8).

13.4 Move L-Proxy into a new LNS project

Problem

When moving an L-Proxy device from one LonMaker/NL220/Alex project into a different LonMaker/NL220/Alex project one must delete the L-Proxy port in the old project before adding the L-Proxy device in a different project.

Explanation

If L-Proxy is moved from one LonMaker/NL220/Alex project into a different project LonMaker/NL220 must release all captured resources in L-Proxy. Resources are released when the L-Proxy Port is deleted from the LonMaker/NL220/Alex project.

Solution

Select the L-Proxy Port in the old LonMaker/NL220/Alex project and choose Delete/Remove from the context menu. Make sure that the device can be reached by LonMaker/NL220/Alex during the deletion process. Therefore LonMaker/NL220/Alex must be On-Net. This process must be followed for all L-Proxy ports that have been used.

As a second alternative the L-Proxy can be set into its factory default state through the console interface, see Section 5.8.

13.5 Node does not respond to poll request

Problem

The input NV on the L-Proxy is being polled by another node but L-Proxy does not respond to the poll message.

Explanation

If the L-Proxy internal connection consists of only one input NV and one or more output NVs then this input NV cannot be polled by another node. If the internal connection has 2 or more input NVs and the poll is received on the first input NV the poll will be forwarded on the second input NV.

If the internal connections uses active poll (active poll flag enabled) the input NV that outputs the active poll (first input NV if multiple input NVs exist) cannot be polled.

Solution

Always poll the source of the information (output NV on source node) and not the input NV of the L-Proxy.

13.6 L-Proxy doesn't forward packets after commissioning

Problem

No packets are forwarded by L-Proxy after one or more ports have been re-commissioned.

Explanation

The L-Proxy configuration will be deleted when one or more ports are commissioned.

Solution

Always download the L-Proxy configuration after commissioning one or more L-Proxy ports.

13.7 Technical Support

LOYTEC offers free telephone and e-mail support for our L-Gate product series. If none of the above descriptions solves your specific problem please contact us at the following address:

LOYTEC electronics GmbH
Blumengasse 35
A-1170 Vienna
Austria / Europe

email : support@loytec.com
web : <http://www.loytec.com>
tel : +43/1/40208050
fax : +43/1/402080599

or

LOYTEC Americas Inc.
583 Union Chapel Road
Cedar Creek, TX 78612
USA

Email: support@loytec-americas.com
web: <http://www.loytec-americas.com>
tel: +1/512/332 2445
fax: +1/512/332 2445

14 Application Notes

14.1 The LSD Tool

Please refer to application note “AN002E LSD Tool” for further information about the LOYTEC system diagnostics tool for the L-Proxy.

15 Firmware Versions

Table 9 shows the most important features available only in certain firmware versions depending on the firmware version.

Firmware Version Supported Features	1.0 Final 1	2.0 0	2.1.0	3.0.0
Console Menu (configuration & firmware update)	√	√	√	√
Binding across domains	√	√	√	√
Address table extension	√	√	√	√
Firewall	√	√	√	√
Password protection	√	√	√	√
Statistics information		√	√	√
SNVT translation		√	√	√
Real time clock		√	√	√
TP-1250 backbone mode	√	√	√	n/a
RS-485 bit-rate detection		√	√	n/a
Active Polls		√	√	√
LSD 2.0 support			√	√
EIA-852 backbone				√
Web interface				√
Static and external (polled) NVs				√

Table 9: Available features depending on firmware version.

16 Specifications

16.1 LP-33E100

Operating Voltage.....	12-35 VDC or 12-24 VAC $\pm 10\%$
Power Consumption.....	typ. 3 W
In rush current.....	up to 950 mA @ 24 VAC
Operating Temperature (ambient)	0°C to + 50°C
Storage Temperature.....	10°C to +85°C
Humidity (non condensing) operating	10 to 90% RH @ 50°C
Humidity (non condensing) storage.....	90% RH @ 50°C
Enclosure	Installation enclosure 6 TE, DIN 43 880
Environmental Protection	IP 40 (enclosure); IP 20 (screw terminals)
Installation	DIN rail mounting (EN 50 022) or wall mounting

17 Version History

Date	Version	Author	Description
30-09-02	1.0	DL	Initial revision V1.0
10-21-02		DL	Added Section 13.4
11-07-2002	1.1	DL	Released Version 1.1
12-11-2002	1.2	DL	Added support for NL220 network management tool
02-14-2003	2.0	DL	Add Section 2.7 SNVT Conversion
02-14-2003	2.0	DL	Change screenshots for Plug-in version 2.0
02-14-2003	2.0	DL	Add XIF support in Section 9.3
02-14-2003	2.0	DL	Add Use Case Poll-Update Proxy in Section 10.3
02-14-2003	2.0	DL	in Section 10.4
02-14-2003	2.0	DL	Add Section on LonMark objects.
02-14-2003	2.0	DL	Change Chapter on the application notes
02-14-2003	2.0	DL	Add references in Chapter 18
02-18-2003	2.0	DL	Release Version 2.0 of the user manual
03-27-2003	2.1	DL	Change solution in Section 13.2 and Section 13.3
06-30-2003	2.1	DL	Add Section 13.5 Node does not respond to poll request
06-30-2003	2.1	DL	Add Section 13.6 L-Proxy doesn't forward packets after commissioning
08-14-2003	2.1	DL	Add Section 10.4 Poll-On-Startup Proxy
01-12-2004	2.2	NR	Add description how to use L-Proxy in Alex
05-01-2007	3.0	STS	Changed for L-Proxy firmware 3.0 and LP-33E100

18 References

- [1] LonMark Application Layer Interoperability Guidelines, Version 3.3, October 2002
- [2] L-Proxy User Manual, Version 2.2, December 2004.